Emerging Environmental Security Issues

Monthly Environmental Scanning

Summarizing document with the items organized by theme

—Items identified between August 2002 and January 2009—

(DRAFT – work in progress for the 2009 State of the Future)

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FOREWORD

The purpose of the monthly environmental security scanning reports is to assess worldwide environment-related events in order to identify and analyze issues that might trigger future international environmental regulations and/or modifications to the existing ones with potential implications for the military.

The Millennium Project defines environmental security as environmental viability for life support, with three sub-elements:

- preventing or repairing military damage to the environment,
- preventing or responding to environmentally caused conflicts, and
- protecting the environment due to its inherent moral value.

This chapter presents a summary of the events and emerging environmental security-related issues organized around this definition.

Over the past several years, with support from the U.S. Army Environmental Policy Institute, the Millennium Project has been scanning a variety of sources to produce monthly reports on emerging environmental issues with potential security or treaty implications. Over 1,500 items were identified since this work began in August 2002.

Photos courtesy of: UN, NASA, and ESA
1. EXECUTIVE SUMMARY
(Excerpt from the 2008 State of the Future; to be updated in the 2009 State of the Future)

Taking ecological considerations into account is crucial if we are to avoid long-term environmental problems that can undermine security and development, and lead to further cycles of conflict and displacement.

UN Secretary-General Ban Ki-moon
International Day for Preventing the Exploitation of the Environment in War and Armed Conflict, November 6, 2007

The world has moved from a global threat once called the Cold War to what now should be considered the Warming War.

Afelee Pita, Tuvalu Ambassador to the UN

The dramatic increase in world attention to climate change is helping more people understand that the world’s environment is a matter of national and global security. Half the world is vulnerable to social instability and violence due to numerous pressures: rising oil and food prices; decreasing water-food-energy supply per person; climate change; and increasing migrations stemming from political, environmental, and economic conditions.

Environment is an increasingly important component in forecasting future conflicts. Scientists, policy analysts, and military planners are collaborating to prevent or reduce security threats. Environmental diplomacy is increasingly being used to support conflict prevention efforts and to build international confidence.

International environmental governance is improving, and the technological ability to identify environmental threats and crimes is becoming cost-effective through new sensors and communication systems. Environmental damages that people and organizations got away with in the past are less likely to escape detection and punishment in the future.

General Patterns and Insights

The need for strategic planning to address climate change and environmental degradation tops the agenda of the United Nations, many national governments, official forums, corporations, NGOs, and academic institutions.

The trend toward adopting the precautionary principle versus reactive actions is increasing. Scientists recommend that nations integrate climate change into their security policy to prepare for worst-case scenarios.

The time between the design of a multilateral environmental agreement and its coming into force as well as the time it takes to reach a high ratification level is shortening. International attention
is shifting from designing new MEAs to improving the effectiveness of existing agreements.

The increasing ratification of MEAs, the growing numbers of environmental watchdogs, as well as increasing public awareness are improving environmental management globally. The number, precision, and breadth of analytical tools to measure environmental change are improving rapidly.

Efforts are increasing to strengthen international environmental governance by improving institutional structures and interlinkages among treaties, enhancing monitoring systems, and developing international guidelines and frameworks for environmentally sound management.

The decision by the regime in Myanmar (Burma) in May 2008 to block international assistance to 2.5 million cyclone victims raises the question of when human rights and environmental security overrule sovereignty. In the 1990s, UN peacekeeping forces protected the delivery of food in Somalia without regard to sovereignty. Since similar situations are likely in the future, many are increasingly aware that a framework and international agreement is needed to guide decisions on when international intervention is warranted.

More cooperation is occurring among a variety of institutions for better, more synergistic environmental policy and activities, which expands the scope of environmental considerations among a broader set of actors and the public.

Militaries are increasingly called upon to assist in environmentally related issues, such as natural disasters or conflicts triggered by or affecting the environment, MEA enforcement, and reduction of their own environmental impacts.

Nontraditional security issues—including environment, migration, and social development—increasingly dominate traditional security planning. Since they cannot be addressed by any nation alone, military strategies and geopolitics are being reshaped around complex issues and within international cooperation frameworks.

When international negotiations under the UN fail, nations form coalitions to carry out negotiations and procedures for an international accord. A successful example is the Oslo Process for the Cluster Bombs Convention, which started in 2007 after the 2006 UN negotiations failed. The process led to an agreement formally adopted in May 2008. Similarly, when MEA negotiations prove difficult or government reaction inadequate, idea-centered initiatives emerge and adopt local regulations.

As the world’s population grows and biodiversity diminishes, the threat of conflict over resources increases. Environmental problems worsen faster than response policies are currently being adopted. Increased focus for adaptation and mitigation is needed in the multilateral arena (such as the G8, UN Security Council, and UN specialized bodies) to strengthen international regulations, improve capacity building from detection to adaptation, address migration issues, and adapt cooperation among countries to the new realities induced by climate change.

Rising sea levels and melting ice caps will redraw physical boundaries, potentially forcing the
evacuation of island nations like Tuvalu in the South Pacific and causing tensions over new shipping routes, such as the Northwest Passage. The panoply of issues triggered by Arctic ice thawing reflects the amplifying debate between environmental aspects and political and military interests.

MEAs often conflict with national economic or political interests, generating issues of noncompliance with international treaties, lack of cooperation with international organs, and deadlock in many international treaty–related negotiations. Matters of disagreement are mostly related to strategies for greenhouse gas emission cuts, nuclear nonproliferation, addressing security aspects of environmental implications, and outer-space security issues.

Environmental issues are a “conflict threat multiplier.” Most conflicts are occurring in the least environmentally sustainable regions, and unless environmental and conflict factors are simultaneously addressed, neither are likely to be resolved successfully.

Without more serious mitigation and adaptation measures, mass migration and conflicts seem inevitable due to climate change, falling water tables, and other contributing environmental factors. Nevertheless, there is no adequate international system or framework to cope with environmental refugees, estimated to reach 250 million by 2050.

The accelerating rate of technological change has fundamentally changed the spectrum of threats to the environment and human health, such as e-waste, possible risks of using nanotechnology and biotechnology, use of chemicals, and the spread and safety of nuclear, chemical, and biotechnology labs.

Work is under way to develop a global system for countering pandemics from either natural or terrorist causes.

Developing countries are rapidly adopting environmentally sound policies and increasingly restricting richer countries’ export of polluting industries to poorer regions. Nevertheless, stronger international and transinstitutional coalitions and frameworks are needed to counter global environmental crime, such as illegal trade in hazardous wastes, smuggling proscribed hazardous materials, and exploiting and trafficking protected natural resources.

Earth observation data provided by satellite systems are becoming an essential tool for designing sustainable development policies and early warning mechanisms. Although space technology enhances Earth surveillance, provides early warnings of natural disasters, improves compliance mechanisms, and increases understanding of space and Earth phenomena, local on-the-ground coordination and applications are still deficient.

The costs are falling for nanotech environmental sensors, which can be connected to global information systems via satellite, potentially making environmentally damaging actions known instantaneously and worldwide.

ICT and robotics, new detection and cleanup techniques, and more environmentally friendly warfare contribute to reducing the military environmental footprint.
Preventing or Repairing Military Damage to the Environment

The UN reports that about half of all conflicts over the past 20 years were “re-conflicts”—those that recurred within five years of peace accords. Many had environmental backgrounds. There is consensus that failed states are the most vulnerable to climate change and possible conflicts due to environment-related issues.

Environmental degradation and hazardous ordnance leftovers in post-conflict areas threaten the livelihoods and health of current and future generations and may constitute an impediment for lasting peace. There should be a “green chapter” in the Geneva Conventions for safeguarding the rights of the environment.

*National Security and the Threat of Climate Change*, a report by a group of high-ranking U.S. military officers and national security experts, warns that “climate change could seriously exacerbate already marginal living standards… causing widespread political instability and the likelihood of failed states…. The chaos that results can be an incubator of civil strife, genocide, and the growth of terrorism.”

Failed States Index 2008

The military is increasingly called to take part in post-conflict reconstruction efforts and environmental restoration to build stability, as well as in mitigation of environmental effects to avoid conflict. The report entitled *A Climate of Conflict* by Dan Smith and Janani Vivekananda published by International Alert in London warns that unless adequate and timely adaptation
policies are implemented, more than half of the world’s nations are at risk. It identifies 46 countries—home to 2.7 billion people—at high risk of armed conflict, while another 56 states—with a total population of 1.2 billion—are at risk of political instability.

Conflict and environmental degradation exacerbate each other. Middle East countries are among the least environmentally sustainable, and conflict has caused massive damages to ecosystems from Iraq to Lebanon and North Africa. Refugees, human rights groups, and legal experts have urged the International Criminal Court to consider human-made environmental crimes along with terror and mass killings in the prosecution of Sudanese officials and Arab Janjaweed. They argue that the crisis was aggravated by the ecological destruction used by the government as a weapon to force people to move. The number of refugees in camps reached 2.2 million and the risk of unrest is increasing as resources are getting exhausted. The deployment and work of the joint UN-African Union force of 26,000 peacekeepers is jeopardized by lack of water. In 2007, an estimated 26 million people were internally displaced by armed conflicts and violence worldwide.

Many post-conflict health and environmental impact assessments are ongoing, as are liability disputes. The Portfolio of Mine Action Projects 2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of cluster bombs and other explosives. Protocol V on Explosive Remnants of War of the Convention on Certain Conventional Weapons came into force in November 2006. The Convention on Cluster Munitions was formally adopted in May 2008, legally binding the use, production, transfer, and stockpiling of cluster munitions and committing countries to clear areas contaminated by cluster munitions and to assist victims and affected communities.

Concerns over the environmental and health effects of the use of depleted uranium munitions are resurfacing and increasing worldwide. The European Parliament adopted a resolution calling on the EU to lead negotiations “through the UN or through a ‘coalition of the willing’” for a global treaty to ban depleted uranium weapons.

Over the past 10 years, only 30% of known chemical weapons stocks have been destroyed. The remaining 70% are supposed to be totally destroyed by 2012 to meet the Chemical Weapons Convention stipulations. Japan is not on schedule to meet its obligations toward China in the recovery and destruction of hundreds of thousands of chemical weapons abandoned at the end of World War II and will most probably not meet the April 2012 deadline. Some experts argue that “nonlethal” materials such as “incapacitating agents” are toxic chemicals that would violate the CWC if used on the battlefield. Clarification of what chemicals will be allowed under the treaty’s exceptions is needed.

Advances in biosciences not met by adequate security systems increase the risks of their potential misuse, the threat of biological weapons, and the likelihood of SIMAD, for Single Individuals Massively Destructive. The Biological Weapons Convention might need to be revised in view of the new synthetic biology developments, and verification and monitoring regimes would need to be developed to ensure compliance. Over 150 nations have fulfilled their reporting responsibilities to the Security Council regarding efforts to combat the proliferation of weapons of mass destruction by non-State actors.
New technologies are offering improved detection, cleanup, monitoring, and surveillance possibilities. WHO is developing a global epidemic simulator based on the model of climate monitoring systems. Small robotic helicopters operated by radio control could be used for reconnaissance and surveillance. High-sensitivity portable chemical and biological devices offer high accuracy detection, monitoring, and cleanup possibilities with rapid response time. However, future autonomous robotic weapon systems (without human decision-making control) are increasing vulnerability and concern over possible catastrophes.

In order to prevent the misuse of science, it is important to strengthen the scientific expertise of security organizations and to create an independent science and technology advisory committee for intelligence agencies, as well as to promote within the international scientific community a common culture of awareness and responsibility.

**Preventing or Responding to Environmentally Caused Conflicts**

Increasingly scarce resources, climate change, biofuels, and growing population and higher living standards are all contributing to the long-term rise of food prices. In 2007, dairy prices rose nearly 80% and grain 42%. If this trend continues, the number of people facing famine or malnutrition is expected to grow from at least 850 million today to 1 billion, increasing instability. Food riots have already occurred in some 30 countries, including recently conflict-torn nations such as Haiti, Côte d’Ivoire, Senegal, and Somalia. Meantime, a few agricultural biotechnology companies are trying to concentrate corporate power and gain monopoly over a large part of global food, in some cases undermining agricultural productivity and jeopardizing national food security. With nearly 3 billion people making $2 or less per day, long-term global social conflict seems inevitable without more serious food policies, scientific breakthroughs, and dietary changes. A new UN Task Force on the Global Food Crisis was designated to prepare a comprehensive plan of action to tackle the rise in food prices.

The UN, OSCE, and NATO are paying increasing attention to environmental security. The UN Security Council debated the relationship of security and the environment for the first time in history in April 2007 and more recently acknowledged that the UN should move from a culture of “reaction” to one of conflict “prevention” and should develop potential tension detection mechanisms. The OSCE adopted a Ministerial Declaration on Environment and Security, and the NATO Security Science Forum on Environmental Security addressed the security implications of environmental issues, forecasting, and cooperation with other international organizations.

The number of weather-related disasters worldwide now averages 400–500 a year compared with 125 in the early 1980s. The number of people affected by natural disasters in 2007 reached 200 million. The UN notes that seven times more livelihoods have been devastated by natural disasters than by war worldwide, and this is likely going to be worsening due to climate change. The intensity of Atlantic storms has nearly doubled over the last 30 years, and computer models show a direct link between climate change and the strength of storms. Some officials say that climate change should be addressed like World War III.
UNEP warns that changing temperatures, rapid rates of species extinction, and unsustainable depletion of the world’s scarce resources are the most important threats to human survival. The Climate Change and International Security paper to the European Council notes that the “impact of climate change on international security is not a problem of the future but already of today and one which will stay with us” and underlines that the European Security Strategy and related proposals “should take account of the security dimension of climate change.”

The WMO reports that the decade of 1998–2007 was the warmest on record, with the global mean surface temperature for 2007 estimated at 0.41°C (0.74°F) above the 1961–1990 annual average of 14°C (57.20°F). Extreme temperatures in 2007 included unusually cold winters in South America and heat waves in Europe. Some scientists believe that weird weather patterns might become the norm and that the world is more than 50% likely to experience serious climate change, for we are unlikely to keep greenhouse gas levels low enough to avoid the critical 2°C (3.6°F) temperature rise.

Climate modelers at the UK’s Hadley Centre for Climate Prediction and Research show that by 2015 the average global temperature will be 0.5°C above the average value for the last 30 years and that between 2009 and 2015, half the years will be warmer than the current warmest year on record. The IPCC projects that in 2090–2099 relative to 1980–1999, temperature rise could range between 0.3°C and 6.4°C.

The Arctic is warming faster than the rest of the world. The region might be ice-free in summer in the next 10–20 years, although some scientists say that there is a 50% chance for that to happen in 2008. In 2007, the Arctic sea ice shrunk to 22% less than the record since satellite measurements began nearly 30 years ago, looking similar to some forecasts for 2030 to 2050. The thawing of Arctic sea ice opens up the Northwest Passage as an international shipping route, with access to rich resources—including oil—triggering international disputes over sovereignty and ecological implications. The debate is intensifying as several countries are building their political and legal cases to claim jurisdiction over different (and sometimes overlapping) areas. The Ilulissat Declaration signed in May 2008 by Canada, Denmark, Norway, Russia, and the U.S. is a commitment for applying the UN Law of the Sea “to the orderly settlement of any possible overlapping claims,” stipulating that there is “no need to develop a new comprehensive international legal regime to govern the Arctic Ocean.” Critics say that this opens the possibility for a polar “carve up” by the five countries.

Although the Antarctic should be protected by the 1959 Antarctic Treaty and related agreements, Britain’s Foreign Office plans to claim 1 million square kilometers (386,000 square miles) of seabed off the coast of the British Antarctic Territory. Similar claims for seabed areas might also be submitted by Chile and Argentina, which might overlap some of the British territorial claims. Greenpeace and WWF warned that Britain’s possible oil, gas, and mineral exploration in the region would represent an environmental disaster for the fragile ecosystem.

Glaciers—representing the only freshwater source for millions of people around the globe—are melting and thinning at an accelerating rate over the past decade. The most vulnerable are Earth’s subtropic zones—home to 70% of the world’s population—including parts of the Middle East, southern Africa, the U.S., South America, and the Mediterranean. The IPCC estimates that
rising temperatures could melt most of Latin America’s glaciers by 2022, affecting the livelihood of people in Peru, Ecuador, and Bolivia. In some regions, demand for water might exceed supply as soon as 2009. Himalayan glaciers are the main source for Asia’s nine largest rivers. UNEP estimates that by 2025, some 1.8 billion people will live in countries with absolute water scarcity. The Human Rights Council is considering adopting water as a human right and is assessing the relationship between climate change and human rights.

Ice caps and glaciers contribute 60% of the ice melting that is one cause of increasing sea levels; 28% of this comes from Greenland and 12% from Antarctica. Estimates of sea level rise by 2100 due to global warming vary from the 9–88 centimeters projected by the IPCC to as much as 140 centimeters. Satellite measurements show that since 1993 global averaged sea level has been rising at about 3 millimeters per year, considerably more than the twentieth century average of about 1.7 millimeters per year. By 2025 coastal population is expected to reach 6 billion.

The small island-state of Tuvalu could disappear in 30–50 years. Indonesia said it has lost 26 islands to climate change. Bangkok, with a population of more than 10 million, might be submerged within the next 15–20 years. It is one of 13 of the world’s 20 largest cities at risk of being swamped as sea levels rise in coming decades. Increased salinity and flooding could displace over 70 million people in Bangladesh, 22 million in Vietnam, and 6 million in Egypt. China’s Pearl River Delta, the country’s most economically dynamic region, is expected to be the worst hit by rising sea levels by 2050. Maldives President Maumoon Abdul Gayoom called for recognition of “environmental protection as a fundamental human right” and announced that the Maldives will initiate a debate on the issue with the Human Rights Council.

Disasters could be exacerbated by other consequences of glaciers melting, such as dilution in salinity of the sea around Antarctica, which could have significant effects on the world’s climate and ocean currents, and melting ice caps that may trigger more volcanic eruptions.

Most of the countries with the highest birth rates are those already affected by the world’s worst wars. Growing pressure of people on land and resources is likely to exacerbate conflict in those areas. Desertification affects more than 250 million people, and 1 billion more are at risk. In Africa, the worst rains in 30 years caused flooding affecting an estimated 1.5 million people in 22 countries, including Ethiopia, Niger, and Sudan. Semiarid areas of sub-Saharan Africa with some of the highest concentrations of poverty in the world face potential productivity losses of 25% by 2060.

By 2050, some 250 million people could be permanently displaced by climate change–related phenomena. UNHCR remarks that after several years of decline, the number of refugees began rising again. Without a legal framework to address environmental refugees’ situation, their rights will not be addressed and conflicts will be difficult to avoid. The Global Humanitarian Forum, launched in October 2007, is being set up by former UN Secretary-General Kofi Annan to address in a preventive and proactive way global refugee movements and humanitarian crises triggered mainly by climate change. It will act as a catalyst among the different interest groups involved in international disaster relief and prevention: governments, aid agencies, the military, the business world, and academics.
The World Health Organization warns of the increasing risk of disease outbreaks, epidemics, industrial accidents, natural disasters, and other health emergencies, which could become threats to global public health security. The International Health Regulations, which came into force in 2007, are helping countries collaborate to identify and contain risks from outbreaks and other health hazards. WHO points out pandemic influenza as the most feared threat to health security.

Increased research is needed to identify areas of highest vulnerability and instability and to consider climate change in foreign aid programs. Military and police will have to change from reactive to proactive strategies in order to prevent and manage security issues triggered by climate change. Unrest could range from protests against polluting companies and government inaction to new forms of ecoterrorism.

The Bali Action Plan provides a roadmap of adaptation and mitigation measures. However, the funding of programs and technology transfer is falling short. While it is difficult to have the world commit $30 billion a year to prevent conflicts over food, the subsidies to fossil fuel industries amount to over $200 billion per year, $1.2 trillion is spent on the military, and $1.5 trillion is spent on oil.

Expenditures and estimated costs of various programs
(yearly, billion $, various years, 2003–2007)

![Expenditures and estimated costs of various programs](image)

Sources: World Bank, International Peace Bureau, Worldwatch Institute, FAO

**Protecting the Environment Due to Its Inherent Moral Value**

Plant and animal species are being lost at a rate between 100 and 1,000 times natural extinction rates. WWF and the Global Footprint Network report that humanity’s impact on the planet has more than tripled since 1961 and that Earth’s resources are being used faster than they can be replaced by nature. If present trends continue, by 2050 humanity will demand twice as much as the planet can supply. The Millennium Ecosystem Assessment reported that 60% of Earth’s vital ecosystem services are being degraded or used unsustainably.

There are more than 700 MEAs. The focus of international negotiations is switching from...
designing new treaties to reinforcing existing ones and strengthening international environmental governance. Evaluation mechanisms of the effectiveness of these agreements are improving. Nevertheless, noncompliance with international treaties and lack of cooperation with international organs, as well as deadlock in many international treaty–related negotiations, continue to be an international concern.

The 2007 UNEP Governing Council adopted decisions on issues related to strengthening international environmental governance (including the draft Environment Watch Strategy Vision 2020 and coordination and synergies among multilateral environmental agreements) and improving the assessment of the world environmental situation and mitigation actions. There are efforts for better integration of the existing MEAs that cover related issues, such as the Basel Convention on Waste and the Stockholm Convention on POPs for developing a framework for environmentally sound waste disposal.

The EC’s three-year program to modernize EU legislation—as part of its commitment to simplify the EU system of rules—started with the environment-related sector, since it is the most heavily regulated. The EU is also adopting the protection of the environment through criminal law. The European Environmental Liability Directive came into force, establishing a comprehensive responsibilities framework based on the “polluter pays” principle. The European Commission opened several infringement procedures against member states for not complying with EU environmental legislation.

Increasingly powerful analytic models and tools are being created to compare national environmental status. New international watchdog bodies emerge and others are being proposed to assist legal action against environmental crimes.

Some noteworthy environmental agreements or regulations that were recently adopted or strengthened or are in negotiation include:

- Convention on Cluster Munitions (adopted in May 2008)
- EU resolution to lead negotiations for a global treaty to ban depleted uranium weapons (adopted in May 2008)
- Stockholm Convention evaluation mechanisms (adopted in May 2007) and continued negotiations for noncompliance mechanisms (expected for 2009)
- Non-Legally Binding Instrument on All Types of Forests (adopted in December 2007)
- International Declaration of Reef Rights (received first signatures)
- Network of Marine Protection Areas, to be adopted by 2012
- Bali Action Plan and other negotiations for post-2012 treaty to curb greenhouse gases
- Tougher regulations for mandatory greenhouse gas emission targets are being adopted by countries, regional authorities, local governments, and industries
- European Environmental Liability Directive (entered into force in April 2007)
- EU protection of the environment through criminal law (proposal approved in May 2008)
- Registration, Evaluation and Authorization of Chemicals (REACH) (entered into force in
June 2007)

- EU Revised Green List of the Waste Shipment Regulation (entered into effect in December 2007)
- EU legislation on transboundary shipments of waste (entered into force in July 2007)
- International Convention on the Control of Harmful Anti-Fouling Systems on Ships (enters into force in September 2008)
- EU airlines mandatory participation in carbon trading scheme to start in 2011
- Fine Particles Air Quality Directive (adopted in December 2007)
- Tougher European waste management strategy with reduction targets to 2008, 2012, 2020
- China’s restrictions on plastic bags (effective June 2008)
- Restrictions for harmful underwater sonar to protect marine mammals (proposed)
- A global ban on mercury (in negotiation)
- Conventional light bulbs to be banned in many parts of the world by 2012

Negotiations have begun for a post-2012 treaty to reduce greenhouse gas emissions. The Bali Action Plan adopted in December 2007 outlines a two-year agenda of negotiations for a global climate regime to enter into force by 2013 but does not include emissions reduction targets, despite strong support by the EU and other countries. The final agreement is to be adopted at the end of 2009 at the Copenhagen summit. It should include both national and international mitigation and adaptation actions to address the effects of climate change, methods to reduce greenhouse gas emissions, development and transfer of climate-friendly technologies, and financing and investment measures. Meantime, questions are growing about better enforcement mechanisms of the Kyoto Protocol to compel governments to respect their commitments.

Aviation and shipping, industries not covered by the Kyoto Protocol, account for some 5–8% of global greenhouse gas emissions. IMO estimates that the shipping industry’s share of global CO₂ emissions could grow from about 4.5% in 2007 to 6% in 2020. Europe projects shipping emissions to grow by 32% and aviation by up to 90% over the same period and therefore is advocating emission reduction targets for these two sectors.

A growing number of industries and local governments are developing appropriate environmental and energy policies and regulations in the absence of national leadership. In many cases these are based on international standards or agreements. Civil society in some countries is increasingly involved in the design of local and regional regulations, in many cases with the help of international NGOs.

Trade of endangered species and hazardous substances is increasingly profitable, difficult to tackle, and involved with international organized crime. Custom administrations reported more than 9,800 endangered species (CITES violations) and 220 hazardous waste seizures in the last few years. The Basel Convention estimates international hazardous waste movement to be at least 8.5 million tons per year. Although it is difficult to estimate the illegal portion of this, a project undertaken in 13 European countries found that over 50% of the waste shipments examined were illegal. There could be even higher percentages in countries with fewer
inspection capabilities and in failed states. The 20–50 million tons of e-waste generated annually is growing worldwide, and about 70% of it is dumped in developing countries in Asia and Africa.

At a high-level meeting in April 2008, the World Customs Organization, representatives of UNEP, customs administrations, and other interested organizations agreed on an Action Plan to improve enforcement and tackle increasing environment crime. The plan calls for increased detection efficiency by customs offices, creation of environmental crime units, and international cooperation and information exchange.

The EU legislation on transboundary shipments of waste came into effect in July 2007, establishing a legal framework to ensure that waste is properly handled from the time it is shipped to the time it is disposed of or recovered.

More than 50,000 chemical compounds are used commercially, hundreds more are added annually, and UNEP estimates global chemical production to increase by 85% over the next 20 years. There are fears that the International Strategy for Chemicals Management adopted in 2006 is not strong enough to ensure adequate security and that a biosecurity watchdog and codes of conduct for scientists should therefore be established. Policymakers and experts reinforce the need to apply the precautionary principle in the context of chemical safety, to extend globally the regulations on heavy metals, and to tackle the widening gaps among countries in following chemical safety policies.

Studies on the environmental and health impacts of various forms of nanotechnology, as well as international research projects on regulating nanotechnologies and adopting nanotechnology standards, are increasing rapidly around the world. The first nanotechnology genotoxicity tests found that carbon nanotubes could damage DNA. China was the first nation to set standards; the European Commission has adopted a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research; the UK’s Royal Society and a group of other organizations have begun an initiative to develop a “Responsible NanoCode” for businesses working with nanotechnologies, while Indian scientists warn that India faces serious nanotech environmental health and safety issues due to absence of guidelines on nanoparticle toxicity and biosafety regulations in India and worldwide.

Biotechnology industry is expanding rapidly, and the supervision of controversial experiments is voluntary and irregular at universities and private laboratories around the world. The Convention on Biological Diversity needs to be adapted in view of the new developments, and verification and monitoring regimes should be developed to ensure compliance. In May 2008, the timetable and framework were set for a liability and redress regime concerning potential damage caused by the movements of GMOs, which will be further discussed in October 2010 at the next meeting of the Parties to the Cartagena Protocol on Biosafety. An ad hoc technical expert group was mandated to consider the risk assessment and risk management issues of GMOs.

UNESCO’s Man and the Biosphere network is expanding, comprising now 529 sites in 105 countries. The UN notes that only 0.6% of the oceans are protected compared with 12% of the world’s land, and a roadmap was launched in 2007 to meet the goal of establishing a network of marine protected areas by 2012. The global map of human impacts to marine ecosystems reveals
that while no ecosystem is completely unaffected, human activities had high impact on over 40% of the world’s ocean-covered area, with the most affected being the North Sea, the South and East China Seas, the Caribbean, and North America’s East Coast. Although the UN Convention on the Law of the Sea is recognized as the legal framework for all activities in the oceans and seas, the debate continues on how the convention applies to marine genetic resources in areas outside national jurisdictions. The EU Marine Strategy Directive requests member states to adopt by 2015 strategies to attain good environmental status by 2020.

Space observations have become a major tool for monitoring environmental change, helping policymakers develop adequate strategies, assisting in the enforcement of environment-related regulations, and improving early warning and disaster management. Examples of these include NASA’s computer model to anticipate food shortages/crises, a new UN Outer Space Affairs office as part of a future network dedicated to carry out the UN Platform for Space-based Information for Disaster Management and Emergency Response, the Global Monitoring for Environment and Security, and support for early warning systems at global and regional levels.

*   *   *

Environmental security analysis should include the impacts of new kinds of weapons; asymmetrical conflicts; increasing demands on natural resources; urbanization (which makes more people dependent on vulnerable public utilities); impacts of environmental degradation and climate change; continued advances in environmental law, with escalating environmental litigation; and the globalization that is increasing interdependencies. In view of increased threats of conflicts triggered by environmental factors, enforcement of international multilateral agreements should be strengthened. The following figures reveal significant efforts on ratifications; however, more efforts are needed in the area of implementation of the regulations, as well as in developing a global environmental consciousness.

Ratifications of 12 multilateral environmental agreements, by UNEP GEO regions (in parenthesis, number of countries in the region)

![Ratifications of multilateral environmental agreements](image)

Source: UNEP GEO Data Portal with updates by the Millennium Project
Number of parties to multilateral environmental agreements, 1975–2008

Source: UNEP GEO Data Portal, with updates by the Millennium Project
2. Summarizing Environmental Security Monthly Scanning  
—August 2002–January 2009—

The purpose of this study is to assess worldwide environmental-related issues in order to identify and analyze events that might trigger future international environmental treaties, conventions, or protocols and/or modifications to the existing ones. About 1,200 items have been identified since August 2002 when the Millennium Project began this monthly scanning. The items are organized in this section by the three sub-elements of the environmental security definition:

A. Preventing or repairing military damage to the environment
B. Preventing or responding to environmentally caused conflicts
C. Protecting the environment due to the moral value of the environment itself

A. Preventing or repairing military damage to the environment

ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA
UN to Shift Attention from Reaction to Prevention of Conflicts
UN Secretary General Reiterates the Link between Environment and Security
UN General Assembly Focuses Government Leaders on Climate Change
UN General Assembly 61st Session Pinpoints Global Warming as a Central Issue for Security
UN Conflict Prevention Strategy Includes Environmental Dimension
Additional Environmental Security Role for the UN Security Council
UK Initiates UN Security Council Debate on Climate Change and Security
UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions
New UN Secretary-General Announced Climate Change a Top Priority
UN Appoints Special Envoys for Climate Change
UN Establishes the International Panel for Sustainable Resource Management
Environmental Considerations Should be Included in Planning Military Operations
Environmental Ministers Advance Global Consensus at UNEP Forum
OSCE Adopts Ministerial Declaration on Environment and Security
France Supports Brazil’s Permanent UN Security Council Seat to Promote Environmental Issues

Environmental Security Issues Discussed at the G8 in Japan, July 2008
Briefings on Environmental Security at NATO Conference
OSCE-NATO Workshop on Environmental Security in the Mediterranean
International Meetings Bring Environment and Security Closer Together
First EU-Central Asia Security Forum Included Environmental Security
UK Defence Ministry Highlights the Link between Environment and Security
Conference on Future of the Dutch Military Includes Environmental Security as an Emerging Military Role
Civil Society Regional Consultations Worldwide Prior to the Global Ministerial Environment Forum
World Leaders Discuss Environmental Security Policies at Davos
UK Scientists List 100 Most Vital Ecological Policy Questions
Environment a Key Element in the First European 18-month Work Program
The Institute for Environmental Security in The Hague to Hold Annual Peace and Sustainability Sessions
French President Jacques Chirac issues Paris Call for Action for Global Ecological Governance
Climate Change a Serious Threat to Security, Conclude Eminent Military Officers
Report on Environment, Security, and Sustainable Development (by the Institute for Environmental Security)
New Environmental Security Blog (Environmental Change and Security Program, WWC)
UN Reform Report Stresses Environmental Issues
UN Reforms in Development, Humanitarian Assistance, and Environment to be Proposed by High-Level Panel
Human Security Proposed as Reorganizing Principle for the UN
*Environment and Security – The Role of the United Nations*
Human and Environmental Security - An Agenda for Change
UN Creates Peacebuilding Commission for Post-Conflict Situations
UN Report Recommends Basis for Global Security Consensus
UNU Institute for Environment and Human Security Founded (Bonn, Germany)
UN Legal Counsel, Under-Secretary-General Hans Corell, Calls for more Focus on State of the Environment
Meeting of OECD Environment Ministers Calls for More Ambitious Policies to Meet the Environmental Targets
UN Annual Treaty Event Produced 93 Actions from 32 Countries
Conference on Environment, Security and Sustainable Development in The Hague
World’s largest Environmental Forum to set priorities
International Conference on Environment, Peace and the Dialogue among Civilizations and Cultures
OSCE-UN Launches Environmental Security Initiative in Southern Caucasus
Environmental Security stressed by World Islamic Forum for Dialogue for inclusion to proposed International Charter on Values for the United Nations
Libya Initiates International Conference on Environmental Security for Seas and Oceans
Pacific Islands Forum Summit in October 2005
Environmental Role for Army Increasing
Former U.S. EPA Administrator Calls for US Leadership in Environmental Protection
U.S. Congressman Leach Calls for New Actions to Address Asian Environmental Security Problems
Somali Piracy is also an Eco-terrorism Threat
Environmental Security Focus of the Nobel Peace Prize for 2007
Branson calls for War Room on Climate Change at the United Nations
Reports Stressing the Link between Environment and Security

**INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS**

- OSCE document on Stockpiles of Conventional Ammunition is a politically binding international instrument that addresses risks arising from ammunition stockpiles
- Ocean Dumping of Chemical Weapons might be addressed by international agreements
- UN Nuclear Terrorism Convention Entered into Force on July 7, 2007
- The Convention on Cluster Munitions
- Global Zero, a New Initiative for Promoting Global Nuclear Disarmament
- Chemical Weapons Convention Gets New Boost
- Meeting of Experts to Strengthen a Global Ban on Biological Weapons
- NATO Creating a special chemical, biological, radiological, and nuclear (CBRN) unit
- U.N. Monitoring, Inspection and Verification Commission (UNMOVIC) might become a permanent agency to investigate biological and missile programs worldwide
- Agent Orange study may spur chemical bans and new claims
- EU Chemical Policy Reforms’ Supporters Ask US Government not to undermine their Efforts
- Nuclear-Free Zones

**CONFLICT AND POST-CONFLICT ENVIRONMENTAL SECURITY ISSUES**

- UN Secretary-General on the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict
- Environmental Destruction during War Aggravates Instability
- UN Designates November 6th as International Day for Conflict and the Environment
- Geneva Convention for Environment
- UNEP may establish a new Secretariat on Environment and Conflict
- UNEP’s Post-conflict Environmental Assessment may one day get extended to ongoing Environmental Assessments
- Collateral Damages Caused by Attacks Need to be Redefined
- New Resolution on Victims’ International Human Rights
- New UN Peacebuilding Commission to Improve Post-Conflict Planning
- UN Secretary-General, Kofi Annan, Calls for Updated Laws against Environmental Damage in War
- UNEP Post-Conflict Assessment Chairman’s input to UN’s High-Level Panel on Threats, Challenges, and Change, the Environmental Change and a New Environmental Security Project at the Woodrow Wilson Center
Conference on Disarmament unable to agree on work program
Cluster Bombs Ban
Sunk Weapons Represent a Growing Health and Environmental Hazard
OSCE Security Forum Urges Destruction of Thousands of Tons of Dangerous Ammunition and Weapons
OECD and the Republic of Georgia signed an agreement to eliminate or recycle leftover munitions dumps on former military bases.
OSCE-UN launches Environmental Security Initiative in Southern Caucasus
International Crisis Group to Debate Considering Climate Change Variable in Conflicts
Australia Claims First Complete Cleanup of an Atomic Bomb Test Site
Controversy over the impacts of depleted uranium
Sustainable Development and Conflict
Governance is Key to Post-conflict Environmental Future Says UNEP Report on Afghanistan
Environment and Security Initiative Progress Report 2006 (Central Asia and Caucasus)
Pressure mounts for increased funds and better techniques for de-mining
Liability for World War II land mines in Egypt
Environmental Change and Security 12th Annual Report—Focus on Africa
Environmental Aspects of the Darfur Conflict
Environment to Get Crucial Role in Sudan's Future Peace and Prosperity Strategy
Disputes over Oil Might Reignite Congo-Uganda Conflict
UN to Demand Israel Pay Lebanon Compensations for War Damages
Hezbollah-Israeli War Threatens an Already Precarious Environment
Report on Lebanon After-war Environmental Assessment
Israeli Trench Raises Environmental Concerns
UNEP Desk Study on the Environment in Iraq
UN to Help Tackle Iraq Pollution
Gulf Environmental Group Planned
Conclusions on Health and Environmental Impact of 1990-1991 Gulf War
Iraq Marshlands to be Restored
Iraqi Environmental Harm in Kuwait Invasion Greater than Thought
Danger of Unexploded Ordnance in Basra Area
Crimes Against the Environment considered on the list of War Crimes against Saddam Hussein
Environmental Viability for Life Support is Increasingly Critical in the Palestinian Occupied Territories
Liability for World War II warships in the Pacific
Effects of Poison Gas Used in WWII by Japan
Japanese Chemical Weapons Cleaning in China Yet to be Completed
Discussions over World War II Japanese Warfare Program in China not Settled Yet
Military Introduction of Tree Pathogen in Italy

NATIONAL AND REGIONAL INITIATIVES AFFECTING MILITARY ACTIVITIES

Sustainable Development Strategies
North American Environmental Security Action Plan
The Disputes over the Northern Territories Set to Continue
U.S. Created Committee to Address Climate Change and Energy Security Issues
U.S. Policy Shift May Improve International Environmental Security
NASA-Like Agency to Achieve a 10-Year Environmental Goal Proposed
New Canadian Strategies for Monitoring the Northwest Passage
Russian Focus on Environmental Security
Russian Military Exercise to Include Environmental Issues
President Putin Cites Environmental Security as Key Criterion for Caspian Energy Projects
EU and US to Cooperate on Environmental Research
EU Energy and Climate Change Policy
European Energy Security Strategies
European Commission’s New Low-carbon 20/20/20 by 2020 Energy Plan
European Temporary Committee on Climate Change to Begin Operations in May 2007
To Join the EU, Balkan Countries Should Increase Environmental Efforts
New Construction on Mediterranean Coastlines to be Banned
UK Defense Ministry released its first Sustainable Development Report
UK to Establish an Independent Climate Committee
France Could Add Teeth to the Kyoto Protocol
EU, Latin American and Caribbean Countries Environment Cooperation
Argentina Redeploys Military to Defend Water and Oil
Ecuador Gets an Environmentalist Foreign Minister
Uganda to Create an Environmental Police Unit
East African Environmental Projects to Fight Crime and Link Journalists
Iran and Iraq Sign Environment Protection Agreement
Israel to Participate in UNEP and UN HABITAT
Waste Disposal a Matter of Discord or Cooperation between Palestine and Israel
Gulf Cooperation Council Elevates Priority of Environmental Protection
Pan-African Parliament Upgrades Environmental Policy
Nigerian Government Resolves to Push Effective Environmental Enforcement
Indian Military Upgrades its Counter-WMD Strategies
New Norwegian Emergency Force Set Up
The Environmental Dimension of Asian Security
Asia-Pacific Should Intensify Green Growth Efforts
Korean Environmental Groups Request Release of U.S. Base Data
UNEP and South Korea to Help North Korea’s Environmental Management
Asian New Strategy to Improve Health and Environment
Japan Sets up e-Waste Collection Locations to Recycle Rare Metals
Climate Change Issues May Have Determined Australian Election
Environment and Security Program in the East-Caspian Region
Environmental security among top three priorities in Australia-China talks
China May Restructure Environmental Effort
China’s Five-Year Plan Increases Attention to Environmental Protection
China's Energy Conditions and Policies—White Paper
China’s New Ministry of Environmental Protection
China Calls for Enhanced Cooperation on Environmental Protection in Northeast Asia
China’s Climate Change and S&T Action Plan
China to Invest $175 Billion in Environmental Protection over Five Years
China Creates 11 Independent Environmental “Watchdog” Centers
China’s President Hu Ordered Environmental Regulations for Military Activities
Chinese Research Priorities for the Next Fifteen Years
Asia and Pacific Countries Adopt Declarations on the Environment
UK Cooperation with India and Others on the Environment and Sustainable Development
India Drafting New National Environment Policy
Environmental Courts Established in the Philippines
US-Uruguay Treaty on S&T Cooperation

**Technological Breakthroughs with Environmental Security Implications**

- Computer Technology and Robotics
- New Detection and Cleanup Techniques
- Counter Bioterrorism or Pandemic Technologies
- Promising Environmental-friendly Technologies
- Space Technology
- Technologies that Could Trigger New Forms of Arms Race
B. Preventing or Responding to Environmentally Caused Conflicts

SECURITY IMPLICATIONS OF ENVIRONMENTAL ASPECTS

Global Security linked to Climate Change
International Conference on Military’s Role in Climate Change
Economic and Security Implications of Climate Change
International Conferences Put Climate Change among Top Security Issues
Increased Role of the Military in Environment-related Crises
UN General Assembly Stressed Environment-related Issues (September 2008)
IISS’s Strategic Survey 2007 Warns of Global Security Implications of Climate Change
Twenty Years of Environmental Security
National Security Implications of Global Climate Change Through 2030
Global Trends 2025: A Transformed World
Climate Change Impacts Assessment on U.S. National Security
Arab Mediterranean Governments’ Environmental Security Cooperation
Water and Environmental Research Center to Be Established in UAE
Global Climate Risk Index 2008
Tools for Addressing Humanity’s Growing Ecological Footprint
miniAtlas of Human Security
Global Environment Outlook (GEO-4)
World in Transition – Climate Change as a Security Risk
Six places in the world where climate change could cause political turmoil
An Uncertain Future: Law Enforcement, National Security and Climate Change
UNEP’s Year Book 2008
State of the World Reports
Environmental Change and Security Program 11th Report
Greenland Conference on Global Warming
Developing Countries Most Affected by Global Warming
World Resources 2005--The Wealth of the Poor: Managing Ecosystems to Fight Poverty
Arctic Debate
Disputes over Polar Regions Expands
Kyrgyzstan’s Deforestation Threatens Central Asia’s Security
Indian and Chinese Assessments of Climate Change Consequences
Indigenous Peoples Highly Vulnerable to Climate Change
Security Implication of Climate Change to the EU
Recommendations for Addressing U.S. Environmental Security
Climate Change: A New Threat to Middle East Security
NATURAL DISASTERS
New 2009 Terminology on Disaster Risk Reduction
Scientific evidences and potential consequences
Natural Disasters as an Environmental Security Issue
Worldwatch Institute: Assessing the Relation between Disasters and Conflict
Fourth Assessment Report Climate Change 2007
Adaptation and Vulnerability Report by the IPCC
Human Footprint on Earth Ecosystem at Critical Stage
Joint Science Academies’ Statement on Climate Change
Millennium Ecosystem Assessment Reports
Dust and Climate Change
New Developments for Addressing Natural Disasters
ICSU Launched Global Disaster Research Program
New UN Office Using Space Technology to Assist Mitigation of Disasters
Google to Support Development of Early Warning System in Vulnerable Regions

MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES
Progress on Defining Environmental Refugees
New Strategies Needed to Deal with Global Displacement and Migration
Climate Change Refugees Trends
Environmental Degradation Causes More Refugees than War and Politics
UNU Calls for International Framework for Environmental Refugees
UN Establishes New Agency for Internally Displaced People
Implications of Environmental Migration to National Security
Environmental Refugees Cyberseminar Revealed the Difficulty of Defining Environmental Refugees
Desertification Triggering Migration
Population and Resources Affecting the Risk of Conflict
South Asian environmental migration
Rising Sea Level Triggers Rising Refugee Move

SEA LEVEL RISE
Scientific evidences and possible consequences
Rising Concerns over Rising Seas
Void in High Seas and Coastal Governance
Coastline Erosion due to Rising Sea Waters Signaled Around the World
Small Low-laying Island States in Jeopardy
First People Displaced Due to Rising Sea Levels
Small Island States Adopt Position on Addressing Climate Change
UN Conference on Small Island States and Climate Change

**MELTING SEA ICE AND GLACCIERS**
Scientific evidences and possible consequences
Arctic Debate
Arctic Observing Integrated Network
International assessment of Arctic pollution triggers Action Plan
Mission to Study Arctic Environmental Changes
Disputes over Polar Regions Expands
International Polar Year 2007-2008
Stricter Measures to Protect Polar Regions Expected
First Species declared Endangered Due to Global Warming

**FOOD AND FRESHWATER**
Climate Change and Access to Water Addressed as Human Rights
Food Scarcity Issues
  - Food Security Summit Usefulness Debatable
  - FAO Launched New Crisis Management Centre
  - OSCE Environmental Security Conference Focuses on Land and Water
  - Human Ecological Footprint Increasing Each Year
  - Population Trends and Environmental Impact
    - *Living Planet Report 2006*
    - *Global Risk 2007*, the World Economic Forum
    - *GEO Year Book 2007*, UNEP
  - Dossier about Drylands and Desertification Launched by Scidev.Net
  - Asia’s Progress Jeopardized by Environmental Degradation
  - Grain Harvest Shortfalls may drive conflicts in areas already unstable
  - Sustainable Development and Conflict
    - Biodiversity for Food Security was the Theme of 2004 World Food Day
    - Earth’s Biodiversity Decline Increasing
    - Food Crisis in Southern Africa and Horn of Africa
    - Food Security Observatory Proposed for Sahel-Saharan Region

Freshwater
  - Freshwater Scarcity Issues and Regional Aspects
  - Unless Water Management Improves, Conflicts over Water Are Inevitable
  - Prospects for Conflict over Water Rise in Several Regions
  - International Agreements Are Needed for 158 International Freshwater Basins
Global Plan to Address Freshwater Supplies Negotiated
Water Poverty Index
Tools for Improving Water, Sanitation and Hygiene
Improved Database for Stormwater Best Management Practices
EC Proposal for Water Pricing
Consultative Group on International Agricultural Research (CGIAR) initiates Program to Fight Water Shortages
Could large-scale ocean zoning prevent conflicts?
Singapore’s New Institute of Water Policy
European Water Pollutants List Delayed One Year
Decade Water for Life Launched
International Year of Freshwater, 2003
Reports on Water-related Issues
Water Forums

**HEALTH**

Climate Change Impact on Human Health
UNEP Report Warns of Increasing Changes in Infectious Disease Patterns due to Environmental Encroachments
World Health Organization: Stress Environmental Impact on Human Health
WHO Launched Website on Environmental Health in Emergencies
WHO Report 2007 Addresses Global Health Security Threats
Environment and Human Health Integration
World Network of Regional CDC-like Organizations Proposed
Global Health Security Initiative Upgrades Its Strategic Policy Process
Proposed Global Early Warning System for Monitoring Pandemics
A Community Guide to Environmental Health Available for Liaison Activities
WHO-sponsored pandemic flu task force holds first meeting in Geneva
Avian Influenza
Two Viral Diseases Lie in Wait
The Threat of Pandemic Influenza: Are We Ready?--Workshop Summary (2005)
Europe Embarks on Environment and Health Action Plan
New UN Office Using Space Technology to Assist Mitigation of Disasters
Antigenic Maps Help Trace Development of Diseases
Google to Support Development of Early Warning System in Vulnerable Regions
Nationwide Health Information Network Could Help in Environmental Emergencies
ENERGY SECURITY

New International Renewable Energy Agency Opens in January
An International Energy and Environmental Security Foresight Network
Trends of Energy Use in IEA Countries
World Energy Outlook 2008
EU Energy and Climate Change Policy
World Energy Outlook 2005 -- Middle East and North Africa Insights
Energy and Security: Toward a New Foreign Policy Strategy
Increasing Oil Demand in China and India Raise Security Concerns
China’s Climate Change and S&T Action Plan
European Action Plan on Energy Efficiency

PREVENTION AND ADAPTATION

Adaptation Needs and Actions
Better Disaster Planning to Avoid Environmental Catastrophes
OSCE Workshop on Environmental Risks and Security in Earthquake Areas
Indigenous Peoples Demand More Involvement in Environmental Policies
UN and Governments of Latin America and the Caribbean Met to Improve Disaster Anticipation and Response System
UK Calls for Worldwide Action for Addressing Global Warming
UN Framework Convention on Climate Change Conference
A Sample of Counter Global Warming Activists around the World
Nordic Countries Suggest Actions to Cope with Global Warming
EU Climate Change Policy
European Adaptability to Climate Change is Questioned
Asia-Pacific to Increase Responses to Climate Change
East Asia and Climate Change
International Early Warning Programme to Begin Operations
Indian Ocean Tsunami Warning System
UN Tsunami Early Warning Systems Extended to Mediterranean, Northeast Atlantic
China to Launch Climate Adaptation Program
U.S. Climate Change Science Program Progress Assessment
Calls for recommitment on ten-year anniversary of U.N. Framework Convention on Climate Change
Conference on Resilience Concepts for Large-Scale Disasters

CLIMATE CHANGE COMPUTER MODELING
C. Protecting the Environment Due to Its Inherent Moral Value

ENVIRONMENTAL SECURITY-RELATED INTERNATIONAL REGULATIONS THAT HAVE BEEN OR ARE CLOSE TO COMING INTO FORCE SINCE AUGUST 2002

Access to Information and Liability
- Rotterdam Convention on the Prior Informed Consent (PIC)
- Protocol on Strategic Environmental Assessment (SEA)
- Aarhus Convention
- European Environmental Liability Directive Came Into Force in April 2007
- EU Polluter Pays Bill

Air Pollution
- Geneva Convention on Long-range Transboundary Air Pollution (sixth protocol)—Persistent Organic Pollutants (POPs)
- Gothenburg Protocol on Air Pollution
- EU New Directive on Air Pollution
- EU Airline Carbon Trading to Start in 2011—a Year Earlier than Planned
- ASEAN Agreement on Transboundary Haze Pollution
- Europe to Reduce Fluorinated Gas Emissions
- European Parliament Passed the Fine Particles Air Quality Directive

Aquatic Environment
Freshwater
- EU to Introduce New Regulations to Combat Surface Waters Pollution
- Protocol on Shared Watercourse Systems

Marine Environment
- UN General Assembly Adopts Resolutions on Marine Protection
- IMO Sets New Limits on Ship Fuel Pollution
- Tougher Global Limits Imposed on Air Pollution from Large Ships
- IMO Adopts New Convention on Ships’ Ballast Water
- European Directive on Ship-Source Pollution Became Effective on April 1, 2007
- Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter entered into force on March 24, 2006
- EU Integrated Maritime Policy
- EU Waste Shipment Legislation Came into Force in July 2007
- Anti-Fouling Systems on Ships Convention to Enter into Force in September 2008
- Single-hull Oil Tanker Phase-out
- Proposals to the EU to Cut Sulfur Emissions from Ships
- Oil Spill Fines Increase
- Political Agreement Reached on the European Marine Strategy Directive
- European Parliament Resolution to Protect Whales from Sonar
- Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)
Shipwrecks Removal Treaty Received First Signature
South-west Pacific Islands Might “Localize” Environment-protection Legislation
Marine Protection to Increase
Marine Protected Areas
IMO Establishes First “Mandatory Area to be Avoided” in New Zealand
French create 90-mile Mediterranean Ecological Zone
Micronesian Nations Sign Coral Reef Protection Document
Coral Triangle May Get Regional Protection

**Biological Diversity and Safety**
- Cartagena Protocol on Biosafety
- UN Convention on Biodiversity
- Plant Genetic Resources for Food and Agriculture—FAO International Treaty
- Intensified Efforts Needed to Save Biodiversity
- Protected Sites and Species
- World Parks Congress Adopts Conservation Accord
- International Year of Deserts and Desertification—2006

**Chemicals and other Hazardous Compounds**
- Montreal Protocol (on chemicals that damage the ozone layer)
- Stockholm Convention on Persistent Organic Pollutants
- Rotterdam Convention on PIC for Certain Hazardous Chemicals and Pesticides in International Trade to be expanded
- Global Classification and Labeling System for Chemicals
- Intergovernmental Forum on Chemical Safety becomes part of the International Conference on Chemicals Management
- REACH Program, Europe’s Chemical Regulations Entered into Force on June 1, 2007
- EU Updates the REACH System, and WEEE and RoHS Directives
- Agreement on International Carriage of Dangerous Goods by Inland Waterways (ADN)
- Closer to Entry into Force
- Protocol on Heavy Metals
- Ban on Mercury
- EU to Ban the use of Cadmium in Batteries
- France Bans 30 Pesticide Components
- Restrictions on Plastic Bags Expanding

**Forests Management**
- Agreement to Protect the World’s Forests Adopted
- Sixth UN Forum on Forests Agrees to Multi-Year Work Plan
- International Alliance of Forest Peoples
- Rights of Forest Peoples Need to Be Observed in Anti-deforestation Efforts
- African Rain Forest Protection—International Treaty signed in February 2005

**Greenhouse Gas Emissions**
- Kyoto Protocol
- Carbon Trading Scheme
- EU Greenhouse Gas Emission Trading Scheme (EU ETS)
- World's Mayors Sign Municipal Version of the Kyoto Protocol
- Australia Cuts Sulfur Content in Transport Fuels
Health (pandemics)
- World Health Assembly adopts new International Health Regulations
- UN Upgrades Early Warning System for Health and Terror Alerts
- EU New Law to Control Bird Flu Epidemics

Mountains
- Carpathian Convention Comes Into Force, January 2006
- Prospective International Agreements for Mountain Regions

Waste Management
- Waste Export Regulations Revised and Tightened
- E-waste Management Directive Came into Effect on August 13, 2005
- EU New Strategy on Waste Recycling
- EU Batteries Directive Entered into Force
- China Issues Electronic Waste Rules

Weapons-related
- UN Convention against Nuclear Terrorism
- Chemical Weapon Disposal Continues to Pose Threat
- Preventing Terrorist Access to Weapons of Mass Destruction—UN resolution
- Sweden Initiates New Commission to Cooperate with the UN to Reduce Proliferation of Weapons of Mass Destruction
- New European Union Law Controls Radioactive Sources
- OSCE Document on Stockpiles of Conventional Ammunition
- Protocol on Prohibitions or Restrictions on the Use and Transfer of Mines Other Than Anti-Personnel Mines (MOTAPM)

PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES

Air Pollution
- Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer
- Call for Expanding Montreal Protocol on Ozone-Depleting Substances
- EU Thematic Strategy on Air Pollution for the CAFE Programme
- Vehicle Emissions in Europe
- Trans-boundary Pollution Regulations Need Better Enforcement
- Clean Air for Europe Initiative to Limit Air Pollution
- 2007—The International Year of the Ozone Layer

Aquatic Environment
- Freshwater
  - A New Step Toward Preventing Water Wars
  - Draft Agreement for Management of International Aquifers
**Marine Environment**

International Conference and Assessments Find Rising Ocean Pollution
Marine Biodiversity Protection Regulations Need Improvement
Tougher Law of the Sea Regulations Suggested for Marine Genetic Resources
Shipping to Face New Regulations to Reduce Air Pollution
London Convention Might be Expanded to Include Ocean-based Geoengineering
Deep Seas and Open Oceans Need Urgent Conservation Actions
Ocean/Sea ‘Dead Zones’ was Focus of UNEP Governing Council/Global Ministerial Environment Forum with 158 Nations
Improved Cooperation among International Organizations to Fight Marine Pollution
Could large-scale ocean zoning prevent conflicts?
Maritime Workers Security
U.S. Commission on Ocean Policy Emphasizes Ecosystem-Based Management
Europe to Harmonize Marine Pollution Legislation
Europe looks to maritime rules after tanker spill
International Maritime Organization (IMO) and EU collaborate on oil spill prevention
Transport Canada Proposes New Vessel Operation Regulations
The U.S. Might Ratify the Law of the Sea
Malacca Straits Need Increased Protection from Various Security Threats
Network of Marine Educators Formed to Protect Pacific
Website for Marine Protected Areas and Cetaceans’ Sanctuaries
Network of Marine Protection Areas to be adopted by 2012
New Baltic Sea Action Plan Based on Ecosystem Approach
Whales’ Protection Efforts Increasing
Coalition Urges UN to Consider Legislation to Curb Harmful Ocean Sounds
Measures Needed to Quiet Underwater Noise
UNU Report Urges the Need for a New Treaty on Deep-Sea Research
Greenpeace Calls for Oceans Natural Reserves
Plastic Threats to the Marine Environment

**Chemical and Biological Safety**

**Biosafety**

Cartagena Protocol on Biosafety—Second Working Group on Liability and Redress
Biotechnology Risk in Africa
Bioviolence; Preventing Biological Terror and Crime
Middle East Biosecurity Assessment
Recommendations for the Biological Weapons Convention and other international mechanisms to prevent terrorists from getting pathogens

**Chemical Safety**

Call for Reinforcements to Chemical Safety
New International Strategy for Chemicals Management and 9th Special Session of the UNEP Governing Council
Micro-reactors Challenge Chemical Weapons Convention Effectiveness
International agreement needed to insure laboratory bio-safety and uniformity in biosafety standards and application or compliance requirements
New Strategic Approach to International Chemicals Management (SAICM) launched to address the widening gap among countries in following chemical safety policies
New Chemicals Considered for Toxic Lists
Stockholm Convention on POPs to be expanded
Global Mercury Ban
EU to Ban the use of Cadmium in Batteries
Call for Global Ban on Lead-based Paints
WHO Project to Minimize Risks of Radon
Reactive Nitrogen Beginning To Be Recognized As Environmental Hazard
Methyl Bromide a Continuing International Concern
Possible Risk with Bisphenol A Receiving Increased Attention
Vanishing Supply of World's Helium Calls for Conservation
Canadian Chemical Plan May Go beyond REACH as Environmentalists
    Get New Political Support
Bottled Water Becomes Target of Environmentalists

Greenhouse Gas Emissions
Post-Kyoto Protocol
Aviation and Shipping should be Subject to Emissions Cuts
Aviation to be included in the EU Emissions Trading System from 2012
National and Regional Initiatives
New Zealand Adopts Carbon Trading Scheme in 2009
China Adopting Pollution Tax Systems
New Jersey Ports Pushing for Toxic Diesels Ban

Energy Saving
Ban on Incandescent Light Bulbs Expands
Compact Fluorescent Light Bulbs (CFLs) May Surge to Fore
European Lamp Companies Push Compact Fluorescents, as Does the EU
EU to Set Higher Targets for Cuts in Energy Consumption
European Commission’s New Low-carbon 20/20/20 by 2020 Energy Plan

New Technologies
International Convention for the Evaluation of New Technologies needed
ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations
Increasing Militarization of Space Might Require Outer Space Treaty Review
China’s ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution
Nanotechnology

Nuclear Safety
IAEA Director Warns on Continuous Nuclear Safety Issues
IAEA Director’s Recommendations to Improve Nuclear Safety
International Norms Led by IAEA Are Needed to Stop Smuggling of Nuclear Materials
    and Nuclear Proliferation
Advancements in Setting the Agenda for the 2010 NPT Review
Importance of Nuclear Weapon Disarmament Reiterated by UN

Waste Management
Toxic Waste Disposal of Global Growing Concern
UN University study calls for reducing electronic waste and hazards
Global Environmentally Sound E-waste Disposal System is Needed
European Parliament Proposes Tougher Waste Management Strategy
Basel Convention Needs Revision and Update
Basel Convention on Hazardous Wastes to be Made More Effective
UN E-Waste Forum and Basel Convention’s Conference of Parties
EU Vote on Revision of Waste Directive
EU Pollution Prevention Strategy to Focus on Recycling of Waste
Higher Targets for Packaging Recycling and Recovery
Firm regulations for perchlorates, a component in rocket fuel, are needed
Medications Disposal

**Weapons-related**
European Parliament Passed Resolution Calling for Global Ban of DU Weapons
Support for Total Ban on Nuclear Weapons Increases
Progress on the Nuclear-Test-Ban Treaty
Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction
Chemical Weapons Convention Gets New Boost
Better International Controls Needed to Prevent Bioterrorism
Time to Strengthen the 1972 Biological Weapons Convention
International Convention on Cluster Munitions Adopted by 111 Countries

**IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS**
Likelihood of Climate Lawsuits Increasing
New UN-linked Body Proposed to Protect Biodiversity and Ecosystem Services
Environmental Testing
Calendar with Environmental Deadlines Compliance
UNU Inter-linkages initiative
UNU to discuss global integration of environmental assessments
Improving Environmental Governance, UNU Reports
International Conference on Environmental Compliance and Enforcement
Improving Effectiveness of Multilateral Environmental Agreements
Environmental Performance Index to Help Improve Policymaking
First International Research Center for “Creeping” Environmental Issues
East African Projects to Fight Environmental Crime and Link Journalists
Conviction in Transborder Electromagnetic Pollution Case
Developing countries’ compliance with environmental regulations is expected to improve via new modes of international assistance
IAEA to Improve Nuclear Security in 35 Countries
IAEA Nuclear Terror Prevention Guide
Comprehensive Test Ban Treaty Organization to be Restructured
The UN Security Council Increased its Role in Preventing Terrorist Access to Weapons of Mass Destruction
Problems with Destruction of Chemical Weapons and Potential Proliferation
Progress in the Elimination of Chemical Weapons Stockpiles
Biological Weapons Convention Enforcement
Overview of Explosive Remnants of War Protocol
Improved Cooperation Among International Organizations to Fight Marine Pollution
Global Map of Human Impacts to Marine Ecosystems
Water Footprint Measuring System
Kyoto/Climate Change Enforcement
OECD Environment Ministers Call for more Ambitious Policies
New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties
European Environmental Liability Directive Came Into Force
Environmental Damage to Be Criminalized in the EU
EC Enforces Compliance with EU Environmental Regulations
EC Legislation Reform First Targets Environment-related Rules
European Commission Enforces Environmental Pollution Legislation
EU Starts Legal Action Against Member States on Breaches of Environmental Law
EU to Increase Environmental Regulations Enforcement
EC Enforces Compliance of National Legislation with EU Environmental Regulations
EC Reports EU Environmental Law Enforcement by EU Members is Poor
EU Parliamentary Committee Moves to Strengthen Air Pollution Laws
Aarhus Convention Implementation Strategies
European Network for the Implementation and Enforcement of Environmental Law
(IMPEL) increases it’s role and plans to develop enforcement indicators
UK Suggests Environmental Court similar to Australia and New Zealand
E-waste Directives to be Enforced in the UK
New UK Chemical Data Base for Regulatory Compliance (for REACH)
Denmark to Sue EU Over Annulling Flame Retardant Ban
North America’s Commission for Environmental Cooperation to Increase Enforcement
of Environmental Regulations and Public Participation
North America’s CEC Ministerial Statement
States to Sue the Energy Producers Over Global Warming
North American Environmental Atlas Online
CEC: Future Directions under the Commission for Environmental Cooperation Sound
Management of Chemicals Initiative
A new Biodefense Agency within the Office of the Secretary of the U.S. Department of
Defense suggested by the Institute of Medicine and the National Research Council
ASEAN Seeks East Asia’s Cooperation on Environmental Issues
Asian Regional Forum on Combating Environmental Crime Formed
Southwest Pacific Islands Might “Localize” Environment-protection Legislation
International environmental law—one of the topics on the agenda of the 2003
International Bar Association Meeting
China’s Emergency Response Law to Punish Falsifying Environmental Information
Indonesian Navy to Tighten Security in Sea Border Areas
United Arab Emirates Establish Nuclear Agency
Taiwan Cracking Down on Environmental Violators
Vietnam Cracking Down on Environmental Violators
Preparatory Process Started for the EfE 6th Ministerial Conference
Space Technology for Environmental Regulations Enforcement

INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

New Standard-setting Instruments Adopted at UNESCO’s General Conference
International S&T Information System Proposed
New Standards for Handling Robotic Environmental Equipment
Chemical Emission Certification Extended to Electronic Devices
UNESCO Draft Declaration on Bioethics and Human Rights
New ISO Standard on Sustainable Building
OECD Strengthens Environmental Standards for Companies Bidding on Contracts to
Build Civil Infrastructure Projects around the World
NAFTA is reviewing its Environmental Side Accord
Green Standards to Counter E-waste
ASTM Issues Standard Terminology for Nanotechnology
ANSI to Carry Out Survey on Needs for Nanotech Standards
ISO to Establish Standardization in the Field of Nanotechnologies
China Creates World's First National Standards for Nanotechnology

SAFETY ISSUES

Chemical and Biological safety issues
Some Chemical and Biosecurity Issues
Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?
Toxicogenomics Risk Assessment
Human Biomonitoring for Environmental Chemicals
Scientific Community’s Questions Concerning Biodefense Standards
Proceedings of the Workshop ‘Risk, Uncertainty and Decision Analysis for
Environmental Security and Non-chemical Stressors’
World network of regional CDC-like organizations proposed for combating the effects of bioterrorism
Soviet-Era Anti-plague Institutes Still Pose Environmental Threat
Russia to Destroy All Chemical Weapons Arsenal by 2012
Japanese Chemical Weapons Cleaning in China Yet to be Completed
EU and Japan Respond to Risks from Low Dose Chemicals
Citation Statistics May Reveal Covert Weapons Work
Chemical Munitions on San José Island, Panama

Bioterrorism and Epidemics Threats
Terrorists Could Tap Pharmaceutical Toxins
African Countries are Vulnerable to Bioterrorism
UN Report Recommends New Powers to Combat Bioterrorism and Epidemics
Interpol Warns World Unprepared for an Eventual Bio-terrorist Attack
New NAS Website on Biosecurity
Bioterrorism Via Smuggled Ebola-contaminated Bushmeat from Africa
Russia No Longer Funding Bioterrorism Countermeasures Research
Bioterrorism, Preparedness, Attack and Response Report

Nuclear Safety
Nuclear Security Addressable only Internationally
International Nuclear Safety Regime Review
Nuclear Theft, Smuggling, and Sabotage Countermeasures
UN Agency to Intensify Tracking of Illicit Nuclear Trafficking
SIPRI Year Book 2007 Points out Environmental, Nuclear, and Energy Threats
Multilateral Approach Needed To Keep Nuclear Arms from Terrorists
Increasing Calls for Improved Management of Nuclear Materials and Nonproliferation
Increasing Nuclear Safety and Security
IAEA Annual Report for 2004
Non-Proliferation Treaty Deadlock Continues
Australia to Propose Panel to Advance Work for the NPT Review in 2010
Nuclear-Free Zones
U.S. and Allies Should Change Priorities, Says New Book on Terrorism
Russia Accepts London Convention on Dumping of Radioactive Wastes
A Single set of International Standards is proposed for Nuclear Power Plants from Design
to Decommissioning
Reducing Proliferation Risks by Converting 60 High- to Low-Enriched Uranium
Research Reactors Could Take 10 Years
Safeguarding radioactive materials is inadequate
Nuclear safety during conflicts
Nuclear Safety—groundbreaking resolutions adopted by the IAEA General Conference
ranging from establishing nuclear-weapon-free-zones to nuclear material storage and
transportation
Tightened nuclear security needed to overcome ‘Dirty Bombs’
Commercial radioactive components recognized as “dirty bomb” hazard
FDA Approves Dirty Bomb Antidotes
Increased funds for study of Long-term effects of atomic radiation
New European Union law controls radioactive sources
Proposed EU legal nuclear safety standards was blocked by five countries asking that the
two draft laws be downgraded into non-binding instruments
UN Conference on Disarmament 2003 Session
Russia signs treaty to track nuclear waste
Russian Submarines Dismantlement an International Concern
Russia’s Floating Nuclear Plants Pose International Security Risk
Revival of Nuclear Power in Asia Poses Security Concerns
China to Control NBC and Missile Exports, Possibly Join MTCR
International Cooperation to Address Radioactive Waste Emergent Disaster in
Central Asia
UN Investigators Warn of Illegal Uranium Mining in DRC
Israeli Dimona Nuclear Reactor
Small Disposable Nuclear Power Plants Raise Environmental Concerns
Potential Health Threats of Some New Technologies
Nanotechnology
Electromagnetic Fields
Underwater Sounds from Human Sources Endangering Marine Life
International Convention for the Evaluation of New Technologies needed
Publication of Data Dangerous to the Environment
Toxicogenomic Technologies and Risk Assessment of Environmental Carcinogens: A
Workshop Summary
Leading cancer specialists call for REACH Strengthening
Genetically Modified Organisms (GMO) Issues
Chemicals could be the Cause of ‘Gulf Syndrome’
Japanese Asbestos Claims
Phthalates May Trigger Lupus
Personal Computer Dust Health Implications

POLLUTION
Greenhouse Gas on the Rise
China to Pass U.S. in CO₂ Emissions this Year Making U.S. and China Target for Changing Climate Change Policies
Polluted Skies and Global Warming Puzzle Decoded
Ozone Hole Worst Ever Recorded
New Predictions for the Atmosphere by 2030
 Burning Fossil Fuels Acidifies Oceans, Erodes Coral Reefs
New Research Finds Human Energy Usage is a Long-Term Heating Problem Independent of Greenhouse Gases and Solar Radiation
Pollutants Travel Globally
Health Impacts of Fuels
Safe Toxin Levels Unknown
Drug Metabolites Identified in Wastewater—Removal Possible
Microplastics Recognized as Environmental Threat to Oceans
Dechlorane Plus® Detected in Atmosphere
Accelerating Environmental Health Crises in China
Repeated Spills in China Threaten Human Health and the Environment
North American Report on Children's Health and Environment Indicators
China’s ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution

OTHER ENVIRONMENT-RELATED PROTECTION MEASURES
Desertification Synthesis (Millennium Ecosystem Assessment 3)
Ecosystems & Human Well-being: Wetlands & Water Synthesis
Ecosystems and Human Well-being: Health Synthesis
New International Financial Alliance to Support Biodiversity
GMO Debate Continues
FAO calls for an international framework for GM trees
GM Crops Created Superweed
European environment - State and outlooks 2005
Europe 2005: The Ecological Footprint
Mediterranean Threatened by Development Pressures, Says Blue Plan Report
Europe to Redouble Efforts to Stabilize Biodiversity by 2010
World’s Largest Environmental Forum to Set Priorities
The Little Green Data Book, 2005
New Zealand’s Largest Environmental Management Forum
Brazil launches Project Drake to counter biopiracy
Experts Call For Global Network to Prevent Asteroid Disasters

NEW ORGANIZATIONS WITH MANDATES WITH EVENTUAL ES IMPLICATIONS
Global Facility for Disaster Reduction and Recovery to Mitigate Impact of Natural Disasters
FAO Launched New Crisis Management Centre
WHO-sponsored pandemic flu task force holds first meeting in Geneva
UN Creates Secretariat of the Global Bioenergy Partnership at FAO
‘3R’—Reduce, Reuse and Recycle New Environmental Think Tank for Asia
Asian Consortium on Non-traditional Security Issues
UN StEIP Initiative for Reducing E-Waste
World's First Academy of Environmental Law
UN to Enhance Eco-Development Procedures
Interpol Creates Global Information Center to Combat Bioterror Threat
Carpathian Mountain office of the United Nations Environment Programme
Russian Green Party Formally Organized
China Climate Change Organization Formed
Liberia's First Environment Center Opened
European Green Diplomacy Network
European Chemicals Agency created under the REACH program
European Space Policy Institute founded
New Regional Environmental Offices in Asia to Strengthen Environmental Protection
Network of Environment Centres in Central Asia
Regional Environmental Center for Central and Eastern Europe

NEW INITIATIVES AIMING TO INCREASE ECO-EFFICIENCY
Global Investment Road Map for a Transition to a Greener Economy Launched by UNEP
Green Economy a Solution for Addressing the Global Economic Crises
Corporate CEOs Pledge Actions on Climate Change at UN Global Compact Summit
Renewable Energy Projects May Face New Scrutiny
US EPA recommendations for Green Infrastructure
Green Un-building Becomes Major Environmental Goal
Green Information Technology is forecasted as 2008 Top IT Strategy
State of Green Business 2008
New “Green IT” Software under Development
Energy/Performance Benchmark for Workstations under Development
New Environmentally Friendly City in UAE Offers Cooperation Opportunity
Switching to Green: A renewable energy guide for office and retail companies
Cleantech Report™ by Lux Research
Idle Nighttime Computers Cited as Energy Wasters
Efforts for Increasing Corporate Eco-responsibility
UN Envisaging a Treaty for Multinational Corporations
Climate Change Dialogue Initiative Launched
Second Australia-New Zealand Climate Change and Business Conference
Two Global Alliances for “Greener” Buildings Around the World
UNEP and 150 Labor Unions Agree on Environmental Objectives
Prospects for Hydrogen and Fuel Cells
The Future of Technology Assessment
UK Analysis of Current Green Energy Options
Renewables 2005: Global Status Report
Target 2020: Policies and Measures to Reduce Greenhouse Gas Emissions in the EU
New REN21 Report Links Renewable Energy to Climate Change Solutions
China and India Sign Precedent-Setting Energy Agreement
Chinese Popular and Government Support for Environmental Concerns
Chinese Automobile Industry’s Potential Environmental Emphases
New Israeli Venture Capital Fund for "Clean Tech" Enterprises
Green Buildings in North America Project Started
Global Greenhouse Gas Register
UNCTAD Manual for the Preparers and Users of Eco-efficiency Indicators
European Pollutant Emission Register (EPER)
UNECE Catalogue of Environmental Networks and Data Sources for EECCA
Online Database of Sustainable Consumption Initiatives in North America Launched
A. Preventing or repairing military damage to the environment

ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA

UN to Shift Attention from Reaction to Prevention of Conflicts
The UN Security Council agreed that the UN should improve its capacity to prevent conflicts rather than just react after the conflicts have occurred. To move from a culture of ‘reaction’ to one of effective ‘prevention,’ more UN resources should be focused to identify possible causes of conflict and set up potential conflict detection systems, to promote preventive action in response to threats to international peace and security. Thus, efforts should increase to address the root causes of conflicts, develop early warning systems, mediate disputes, and coordinate efforts of UN bodies, regional organizations and others trying to prevent wars. Along the same lines, in fragile post-conflict countries, peacebuilding should be focused on issues that are potential causes for relapsing into conflict. Over the past five years, the UN has spent $18 billion on peacekeeping operations but has not devoted similar resources to conflict prevention. [See also UN Conflict Prevention Strategy Includes Environmental Dimension in August 2006 and UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions in June 2007 environmental security reports] Meantime, the International Policing Advisory Council (IPAC), which held a 2-day meeting in Canberra, Australia, highlighted the unprecedented global demand for UN peacekeepers and police officers, and stressed the importance of better cooperation with the UN to prevent and face conflict-related challenges. (August 2007, Ref. 1)

UN Secretary General Reiterates the Link between Environment and Security
On the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict, celebrated on November 6, UN Secretary General Ban Ki-moon renewed the call for “protecting the environment as a pillar of our work for peace.” Reiterating that “The environment and natural resources are crucial in consolidating peace within and between war-torn societies,” he gave the example of the transboundary cooperation in the Great Lakes Region of Africa to manage their shared natural resources, and underlined that lasting peace in war-torn regions like Darfur and Afghanistan is not possible without restoration of the ecosystem to support livelihoods. He noted that although “The natural environment enjoys protection under Protocol 1 of the Geneva Conventions… this protection is often violated during war and armed conflict.” [See also UN Secretary-General on the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict in October 2007 environmental security reports] (November 2008) Ref. 2

UN General Assembly Focuses Government Leaders on Climate Change
The theme of the 62nd session of the UN General Assembly was “Responding to Climate Change.” Speeches by heads of state and governments talked about climate change, rising sea levels, droughts and floods—as issues in themselves, but also as related to poverty and social problems, and ultimately to global security. There was again mention of strengthening the UNEP by transforming it into a UN Environmental Organization. This annual General Assembly was
preceded by a high-level meeting convened by the UN Secretary General focusing specifically on climate change and actions to address it. Prior to this meeting was the annual UN-NGO conference that also focused on climate change. These meetings demonstrated a near consensus that urgent action is necessary, and that the UN Framework for Climate Change is the appropriate forum for discussions. The President of the UN General Assembly is preparing to create a Global Compact on Climate Change tentatively planned for release in early 2008 from which many agreements could flow. All of this focuses on the next high-level meeting on climate change to be held in December, in Bali, Indonesia. (September 2007, Ref3)

UN General Assembly 61st Session Pinpoints Global Warming as a Central Issue for Security

Tackling climate change and environmental degradation were mentioned at par with terrorism, fair trade, HIV/AIDS, and human rights as essential issues to be addressed by global action by world leaders at the UN General Assembly, September 2006 Session 19-29. Since the small island developing states are particularly vulnerable to the impacts of global warming and sea level rise, they reiterated the call for renewable energy, a global fund to support these efforts, recognition of the “polluter pays” principle, and the placement of climate change in the center of development considerations. Some declared that the impacts of climate change are the most serious threat to global security. (September 2006) Ref. 4

UN Conflict Prevention Strategy Includes Environmental Dimension

UN Secretary-General Kofi Annan’s Progress report on the prevention of armed conflict is an in-depth review of UN capacities to help prevent crises from escalating into armed conflicts; it outlines a wide range of recommendations to strengthen the UN’s conflict-prevention capacity around the world. Environmental factors are mentioned several times in this 54-page document; e.g., “Environmental degradation has the potential to destabilize already conflict-prone regions, especially when compounded by inequitable access or politicization of access to scarce resources.” (par. 22) The report will be submitted for discussion to the General Assembly on September 7, 2006. (August 2006) Ref. 5

Additional Environmental Security Role for the UN Security Council

Klaus Toepfer, Executive Director of UNEP, said that the restructuring of the UN Security Council might be necessary to address the environment-conflict nexus more efficiently. He stated, “One of the options being discussed is to create a subdivision under the Security Council that focuses on environment-related security concerns.” (October 2004) Ref. 6

UK Initiates UN Security Council Debate on Climate Change and Security

Britain’s foreign secretary argued that future climate change might cause wars: “An unstable climate will exacerbate some of the core drivers of conflict, such as migratory pressures and competition for resources,” and hence it is a matter for the UN Security Council to address. About 50 nations urged the UK to take the issue to the Council. During the debate on April 17, 2007, China argued against this position along with Russia, Qatar, Indonesia, and South Africa, saying that the Security Council is the wrong forum to discuss this and act on climate change-related issues. On behalf of 130 developing nations, Pakistan argued that the issue should be a matter for the UN General Assembly since it was a more democratic institution than the Council. [Yet it is the Council not the Assembly that can authorize peacekeeping forces.] Secretary-
General Ban Ki-moon, acknowledging, “issues of energy and climate change can have implications for peace and security,” called for a “long-term global response” and noted, “this Council has a role to play in working with other competent intergovernmental bodies to address the possible root causes of conflict discussed.” The US supported the development of alternative fuels, energy efficiency, and other voluntary approaches that did not affect economic growth. The EU, Peru, Panama, and Papua New Guinea (head of the Pacific small island states), were among the supporters of the initiative. “The dangers that the small island states and their populations face are no less serious than those nations threatened by guns and bombs,” stated Ambassador Robert Guba Aisi of Papua New Guinea. (April 2007) Ref. 7

Britain to Push on Adding Climate Change to Security Council Agenda
Britain intends to put climate change on the UN Security Council agenda in April—when it assumes the presidency. The intention is to stress that climate change is a matter of international security—from disputes over diminishing natural resources to mass migrations that could exacerbate conflicts. AIDS was similarly put on the Security Council agenda in 2001 and had positive results. Britain began lobbying the other 14 Security Council member states but seems to meet resistance from countries such as the U.S., China, and South Africa. (March 2007) Ref. 8

UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions
A Security Council session dedicated to assessing the link between natural resources and conflict concluded that efforts should increase to improve natural resources management—mainly in failed or vulnerable states—so that their use contributes to post-conflict recovery, rather than fueling conflict. Monitoring and certification systems similar to the Kimberley Process Certification Scheme—concerning “conflict diamonds”—should be developed or emulated to stop illegal exploitation of resources, which triggers, exacerbates, or maintains conflict. The Council report added: In the case of peacekeeping and peacebuilding, the Council should ensure that the root causes of conflicts and the role of resources as a contributing factor were addressed in peace agreements as a way of ensuring that countries did not relapse into the vicious cycle of conflict. Therefore, in order to be more successful, peacekeeping operations should include an environmental and natural resources management dimension. (June 2007) Ref. 9

New UN Secretary-General Announced Climate Change a Top Priority
UN Secretary-General Ban Ki-Moon took office on January 1, 2007 and listed addressing global climate change as a top priority during all of his major meetings, including his first press conference at the UN, his meeting with President George Bush, and public talks in Washington and with the EU leaders in Brussels. Climate change also topped the agenda of the World Economic Forum Annual Meeting at Davos, where Tony Blair said that addressing climate change was the “supreme expression of interdependence.” President Bush for the first time included the issue in his State of the Union address, the new Democratic leadership in the US Congress has it among its top priorities, and corporations are forming relationships with environmental groups. Hence, it is clear that the international politics of climate change could have dramatic changes over the next several years. (January 2007) Ref. 10

UN Appoints Special Envoys for Climate Change
As part of his commitment to enhance the UN's action in addressing climate change, Secretary-
General Ban Ki-moon appointed three Special Envoys, former Norwegian Prime Minister Gro Harlem Brundtland, the President of the 56th Session of the UN General Assembly Han Seung-soo, and former President of Chile Ricardo Lagos. The Special Envoys will work with the Secretary-General, government leaders, and key stakeholders from around the world to advance negotiations and develop mitigation strategies to address climate change and its impacts. (May 2007) Ref. 11

**UN Establishes the International Panel for Sustainable Resource Management**

The International Panel for Sustainable Resource Management (IPSRM) is a new international think tank established by UNEP to provide expert global assessments on the use, security, and environmental impact of global resources. Just as the Intergovernmental Panel on Climate Change (IPCC) founded in 1988 has evolved with the participation of 2,500 scientists from 60 countries to produce the state of knowledge of global climate change, so too could IPSRM do one day for the global knowledge of resource management. It will begin by providing a systemic and holistic framework for understanding resources from all phases of the resources’ life cycles to help identify interlinkages, gaps, and opportunities for policy makers to take action. The Panel is supported by a Secretariat, hosted by the Sustainable Consumption and Production Branch of UNEP's Division of Technology, Industry and Economics, based in Paris. National participation in the panel has been expressed so far from Canada, China, Egypt, Finland, Germany, Hungary, Italy, Japan, Netherlands, Norway, Russia, South Africa, and Tanzania. NGOs such as the World Business Council on Sustainable Development and the International Council for Science (ICSU) have also asked to participate. (November 2007, Ref.12)

**Environmental Considerations Should be Included in Planning Military Operations**

“Green Warriors. Army Environmental Considerations for Contingency Operations from Planning Through Post-Conflict” by RAND Corporation Arroyo Center, is a comprehensive analysis of the environmental aspects in military operations. It shows that considering environmental factors in military actions gives strategic advantages in combat and post-conflict operations, increasing the overall missions’ success. Environmental conditions impact troops’ health, safety and security and affect diplomatic relations and local populations’ and neighboring countries’ confidence in the operation. However, the study finds that the Army doesn’t have a comprehensive approach to environmental considerations at any phase, or in contracting. The recommendations are: “1. Improve the policy and guidance for environmental considerations in contingency operations. 2. Encourage an environmental ethic throughout the Army that extends to contingency operations. 3. Better incorporate environmental considerations into planning. 4. Improve pre-deployment and field environmental training. 5. Invest more in environmental resources and good environmental practices for field operations. 6. Use a ‘sustainability’ model for contingency operations.” Although specifically analyzing the Army, the results apply to any actors involved in contingency operations. (September 2008) Ref.13

**Environmental Ministers Advance Global Consensus at UNEP Forum**

More than 100 environment ministers met in Monaco for the 10th Special Session of the Governing Council/GLOBAL Ministerial Environment Forum of the United Nations Environment Programme (UNEP) on February 20-22. The UNEP Medium-term Strategy 2010-2013 was adopted, which upgrades UNEP’s ability to be more effective in addressing climate change, disasters and conflicts, ecosystem management, environmental governance, harmful substances
and hazardous waste, and resource efficiency – sustainable consumption and production. The theme of the Special Session was “Globalization and the Environment—Mobilizing Finance for the Climate Challenge”. Issues discussed included long-term predictable carbon prices, building public-private partnerships, regionally balanced distribution of funds, UNEP management to implement the Bali Strategic Plan, and better implementation of multi-lateral environmental agreements.

The discussions and ministerial consultations focused on:

- policy issues and strategies for mobilizing finances to address climate challenges, with the main issues being related to: a coherent international framework for addressing climate change; long-term predictable carbon prices; building public-private partnerships; and a balanced distribution of funds by region and scope;
- strengthening international environmental governance and UN reform, mainly related to UNEP organizational aspects, and to improving the environmental international regulations system, by addressing synergies between existing multilateral environmental agreements in order to simplify understanding of the MEAs’ implementation, and compliance monitoring. Although there is consensus on the need to strengthen international environmental governance (IEG), there is no agreement on how to do it. Views range from supporting a more powerful and coherent IEG (including an eventual UNEO) with reform negotiations starting at the General Assembly’s 63rd session, to favoring the status quo with slight improvements. An interesting suggestion was made by Botswana, who noted that for an effective transboundary ecosystem management, neighboring countries should be parties to the same conventions. The US asked that the final report include language requesting that cooperation among MEAs should be subject to the approval of their governing bodies.

The Forum adopted decisions in five areas:

- the UNEP Medium-term Strategy 2010-2013—formulating the strategic frameworks and programs of work and budgets
- chemicals management, mainly concerning the implementation of the decisions related to reducing hazards from mercury, and improving waste management;
- improving the Global Environment Outlook (GEO), including the development of a global assessment of environmental change and its implications;
- inviting ECOSOC to declare 2010-2020 the International Decade for Addressing Climate Change;
- sustainable development of the Arctic region, mainly continuous environmental assessment (including increased international scientific collaboration) and addressing legal aspects.

At the Forum, UNEP also launched the Climate Neutral Network (CN Net) to assist nations and interested actors with reducing greenhouse as emissions (http://www.climateneutral.unep.org) (February 2008, Ref.14)

**UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance**

The 24th session of the United Nations Environment Programme (UNEP) Governing Council/Global Ministerial Environment Forum (GC-24/GMEF) took place 5-9 February 2007, in Nairobi, Kenya. Delegates from 141 countries discussed issues related to globalization and environment (including developing a range of clear and specific policy options for improving environmental governance at national, regional, and global levels), the state of the world environment, and cooperation at different international levels. The GC/GMEF adopted 15
decisions, including issues related to waste management (adequacy of the Basel Convention and eventual further developments), strengthening international environmental governance (including the draft Environment Watch Strategy Vision 2020, and coordination and synergies among multilateral environmental agreements), chemicals management (heavy metals and hazardous chemicals), the world environmental situation (improved assessment and mitigation actions), water policy and strategy, recommending that the UN General Assembly declare the decade 2010-2020 as the UN Decade for Deserts and the Fight Against Desertification, and Africa’s environmental management and protection. Egypt offered to host an international center to build judicial capacity in environmental law. The next GC/GMEF will be held in February 2009. (February 2007) Ref. 15

Controversy over a United Nations Environmental Organization Continues

Last February France along with 46 other countries proposed the establishment of a UN Environmental Organization to encourage and coordinate research and government actions to address climate change. During the Security Council’s debate over security implications of climate change, Italy’s deputy foreign minister, Vittorio Craxi, renewed support for creating a UN environmental organization. The U.S. affirmed support for strengthening the United Nations Environment Programme, but saw no need to create a new UN agency, arguing that the existing UNEP is sufficient for helping countries honor environmental treaty obligations. [See also French President Jacques Chirac issues Paris Call for Action for Global Ecological Governance, and New International Strategy for Chemicals Management and 9th Special Session of the UNEP Governing Council] (April 2007) Ref. 16

OSCE Adopts Ministerial Declaration on Environment and Security

On November 30, the Organization for Security and Cooperation in Europe (OSCE) agreed on a Ministerial Declaration on Environment and Security. However, the OSCE failed to reach consensus on a detailed environmental security strategy. Nevertheless, Ambassador Bernard Snoy, Coordinator of OSCE Economic and Environmental Activities, is confident that the level of OSCE’s commitment in the field of environmental security will increase, especially since countries east of Vienna stress their specific needs regarding these issues. (November 2007, Ref.17)

OSCE Parliamentary Assembly Agrees to Advance Work on Environmental Security Strategy

The OSCE Parliamentary Assembly passed the resolution to support efforts of OSCE’s 56 participating States and 11 Partners “to tackle environmental security threats and thus to promote stability;” to continue work, “to develop an Environmental Security Strategy for the Organization to be debated at the OSCE Ministerial Council in November in Madrid;” to recommend that “the OSCE works closely together with OSCE participating states as well as national and other international organizations experienced in the field of environmental security; and “Calls upon OSCE participating countries to develop their own environmental security strategies.” (July 2007, Ref.18

OSCE to Develop an Environmental Security Strategy

The Economic and Environmental Forum of the Organization for Security and Co-operation in Europe (OSCE), held in May 2007 in Prague focused on constructive actions that would help its 56 participating States and 11 Partners tackle environmental security threats and promote stability. OSCE Chairman-in-Office, Spanish Foreign Minister Miguel Angel Moratinos said: “Environmental co-operation can be an effective catalyst for reducing tensions, broadening co-
operation and promotion of peace.” There was consensus that environmental security should top the Organization’s agenda and the parties agreed to study the implications of climate change on security, the role of environmental sustainability, and how OSCE's actions could complement other organizations’ efforts. An Environmental Security Strategy for the Organization will be developed over the coming year and debated at the OSCE Ministerial Council to be held in November in Madrid. Several follow-up events to the environmental forum are planned. A resolution may be introduced in the OSCE Parliamentary Assembly to further support this governmental initiative to help insure its implementation under the next Chairman-in-Chief of the OSCE. (May 2007) Ref.19

France Supports Brazil’s Permanent UN Security Council Seat to Promote Environmental Issues

Increasing Brazil’s role in international affairs, including a permanent seat on the UN Security Council to provide leadership on environment-related issues, was strongly supported at the second Brazil-EU summit, held in December 2008, by Nicolas Sarkozy, French President and holder of the EU rotating presidency. During the visit, the French and Brazilian leaders also addressed, inter alia, security and military affairs. Meantime, Brazil announced that its new strategic defense plan increases the focus on environmental protection and energy security. (December 2008) Ref. 20

Environmental Security Issues Discussed at the G8 in Japan

Environmental security issues such as climate change, food crises, energy security and disaster reduction were the focus of the 34th G8 Summit held in Toyako, Hokkaido, July 7–9, 2008. Although the Summit ended without an agreement on firm targets for reducing greenhouse gases, the final declaration stipulates a goal of at least 50% by 2050, with mid-term goals to be adopted by individual countries. This does not meet the suggestion made by the G5 countries (Mexico, Brazil, China, India and South Africa), which also attended the Summit, that developed countries’ greenhouse gas reduction targets should be more than 80% by 2050 with an interim target of a 25-40% reduction by 2020. G8 leaders also agreed to implementing ambitious economy-wide mid-term GHG emission reduction goals, using sectoral approaches for achieving national emission objectives, conducting an energy forum to focus on efficiency and new technologies to be held in 2009 in Japan, and establishing the Climate Investment Funds to be administered by the World Bank to support the efforts of developing countries. (July-August 2008) Ref. 21

Briefings on Environmental Security at NATO Conference

Prior to the NATO Summit in April, the NATO Security Science Forum on Environmental Security held in Brussels on March 12th addressed security implications of environmental issues such as climate change, water, energy security, and natural catastrophes. It also looked at environmental security forecasting and cooperation with other international organizations to increase environmental security. Webcasts of the presentations are available on the first website listed below. After the NATO Summit in April in Romania, Russian President Vladimir Putin and NATO leaders agreed to cooperate in several areas, including environmental security. (April 2008, Ref.22)
OSCE-NATO Workshop on Environmental Security in the Mediterranean

The "Water Scarcity, Land Degradation and Desertification in the Mediterranean region—Environment and Security Aspects" workshop held in Valencia, December 10-11, was organized jointly by the NATO Public Diplomacy Division and the Organization for Security and Cooperation in Europe (OSCE) Office of the Coordinator for Economic and Environmental Activities. Policymakers, scientists and experts assessed implications that water scarcity, land degradation, and desertification might have on population movements and security in the Mediterranean region. Since water management also offers opportunities for cooperation and conflict prevention, specific roles for the OSCE, NATO and other organizations were explored with OSCE Mediterranean Partners for Co-operation and the NATO Mediterranean Dialogue, which include Algeria, Egypt, Israel, Jordan, Mauritania, Morocco and Tunisia. [See also OSCE Adopts Ministerial Declaration on Environment and Security in November 2007 and other previous environmental security reports on similar issues.] (December 2007, Ref.23)

International Meetings Bring Environment and Security Closer Together

The Roundtable on Environment and Security, organized alongside the IUCN Congress, was attended by selected representatives from the security community and major environmental leaders who discussed present and future environmental security issues, explored possibilities for cooperation, examined common strategies, and agreed that the impacts of environmental issues on security are increasingly requiring more attention from governments. Physical conflict and military environmental issues were central to the discussions. The Institute for Environmental Security program “Climate Change and International Security” is organizing several meetings to foster environment-security dialogue and set the agenda for some global environmental agreement(s) to reduce the probability of climate change-related conflicts.

Participants in the IUCN World Conservation Congress pointed out that biodiversity losses are not only more serious than the current financial crises, but are also often irreparable. The IUCN Programme 2009–2012 creates a framework for addressing environmental crises from planning to implementing, monitoring, and evaluating conservation work. Issues that got special attention include: high seas, of which less than 1% are under any kind of protection, nearly all located close to shore; forests—summary of the outcomes of the Forests Dialogue’s Initiative on Forests and Climate Change and agreement on five guiding principles for climate change negotiators and tackling deforestation; the role of the environment in avoiding conflict and for post-conflict stability; and better integration of biodiversity concerns into policymaking in all sectors. The new Red List of Threatened Species, unveiled at the Congress, now covers nearly 45,000 species, specifying those that are particularly susceptible to climate change. Over 8,000 people working in conservation or related areas participated in the 10-day IUCN Congress held in Barcelona, Spain, October 5-15, 2008. (October 2008) Ref.24

First EU-Central Asia Security Forum Included Environmental Security

The aim of the first EU-Central Asia Security Forum was to consolidate relations between the EU and the Central Asian governments of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, as envisioned in the EU Strategy for Central Asia. This EU strategy focuses on terrorism, non-proliferation, human and drug trafficking, and energy and environmental security. The EU will help with financing and expertise for curbing illegal traffic of people, arms and drugs, while common energy security issues would be addressed by building infrastructure, including the Nabucco pipeline. The meeting was held in Paris, September 18, and attended by
foreign ministers from the Central Asian countries and the EU member states and candidate countries, EU dignitaries, and experts from other organizations. Afghanistan observed.
Participants agreed to have “regular exchanges” on these security risks. (September 2008) Ref.25

UK Defence Ministry Highlights the Link between Environment and Security
UK Ministry of Defence published its second annual Sustainable Development Report. The 2005 report identified potential risks from nanotechnology, chemical weapons from the WWII, risks from military sonar, and tungsten and its alloys as emerging sustainability issues related to military activities; and most importantly, acknowledged the link between conflict, security and sustainable development. “We must also be ready to act, anywhere in the world, where environmental, social or economic stresses may contribute to the destabilization of society… we have a significant role to play in helping to address these concerns and exploring links between security, conflict and SD with Foreign and Commonwealth Office and Department for International Development,” the report said (DFID). [For the first Annual report, 2004, See the item UK Defense Ministry released its first Sustainable Development Report in the August 2005 environmental security monthly report] (September 2006) Ref. 26

Conference on Future of the Dutch Military Includes Environmental Security as an Emerging Military Role
The Netherlands Ministry of Defence and the Netherlands Institute of International Relations (Clingendael) held a conference December 15–17, 2008 in The Hague on future roles for the Dutch armed forces. The conference was part of the Future Policy Survey, a comprehensive interdepartmental look at future developments and scenarios to the year 2030 to update the Netherland’s defense policies and roles with NATO and the EU. There was some discussion of re-nationalization of defense policy due to ineffectiveness of the EU and NATO. Among the presentations was an overview of future environmental security roles for the military and why these roles will be increasing. (December 2008) Ref. 27

Civil Society Regional Consultations Worldwide Prior to the Global Ministerial Environment Forum
In preparation for the 8th Global Civil Society Forum (GCSF) and the 24th session of the Governing Council/Global Ministerial Environment Forum (GC-24/GMEF) to be held in Nairobi, Kenya, in February 2007, representatives of major groups of civil society held regional consultations around the world. The European Regional Consultation took place in Geneva, October 23–25, and the African Civil Society meeting was held in Nairobi, October 26-27. The discussions were structured around the February GCSF’s central themes—globalization and environment, and UN Reform—with focus on such regional aspects as water, chemicals management, sustainable procurement policies and practices, and international and regional processes. (October 2006) Ref. 28

World Leaders Discuss Environmental Security Policies at Davos
Business and political leaders exchanged ideas for addressing climate change, water shortages, conflict, terrorism, UN Millennium Development Goals, globalization, and new technologies at the World Economic Forum held in Davos, Switzerland, January 23-27, 2008. Japan’s Prime Minister Yasuo Fukuda advocated new climate-change initiatives, including national CO2 reductions for major emitters, increasing global energy efficiency 30% by 2020, and a new
multilateral fund to mitigate climate change and to support developing countries to cope with global warming. He also announced that Japan—holding this year’s G8 presidency—will place climate change at top of the July G8 summit agenda. U.N. Secretary-General Ban Ki-moon asked business and political leaders to make water issues and scarce supplies top priorities, citing environmental factors increasing and/or maintaining conflicts. Business leaders pledged millions of dollars for helping development and agriculture in poor countries by also improving the environment and water use and access. It was suggested that a certain amount of clean water for drinking should be seen as a human right, but water used for economic reasons should be priced to assure its efficient use. (January 2008, Ref.29)

**UK Scientists List 100 Most Vital Ecological Policy Questions**

UK scientists have prepared a list of the 100 biggest questions facing the country's environment. According to Guardian Unlimited, "the list … of Britain's most pressing ecological problems is based on the suggestions of more than 650 experts in universities, conservation groups and government institutes. It is intended to inform policy-makers and steer research over the next decade to answer key questions in areas such as farming, climate change, pollution and urban development." (August 2006) Ref. 30

**Environment a Key Element in the First European 18-month Work Program**

For the first time, the European Council adopted an 18-month work program for the following three European Presidencies to be held from January 2007 to June 2008 by Germany, Portugal, and Slovenia. Along with economic and security matters, it covers environment and sustainable development issues, a reassurance that the EU Strategy for Sustainable Development remains in the focus of policymaking. The Environment chapter includes climate change, biodiversity, environmental technologies, and international environmental governance. The 18-month Programme confirms the EU's strong commitment to environmental matters. (January 2007) Ref. 31

**The Institute for Environmental Security in The Hague to Hold Annual Peace and Sustainability Sessions**

The Institute for Environmental Security will convene annual Peace and Sustainability sessions to address the challenges related to conflict prevention and post-conflict issues. The first session, entitled Forces for Sustainability, will be held on 14-15 March 2007 at the Peace Palace in The Hague. It intends to promote cooperation between different actors (such as the security and development sectors) involved in conflict prevention and/or transition to sustainable development in post-conflict situations. “Challenges to be addressed include—how to: formulate scenarios for change towards transparent governance structures; give priority to supervision of the phasing out of illegal economic activities; retrain and employ militias in professions for the restoration and management of ecosystems and natural resources; create new models of empowerment for local communities” says the announcement. (February 2007) Ref. 32

**French President Jacques Chirac issues Paris Call for Action for Global Ecological Governance**

An international conference on global ecological governance, “Citizens of the Earth,” was held in Paris at the instigation of President Jacques Chirac, who issued the Paris Call for Action for Global Ecological Governance and invited all nations to come to Paris to make progress on the
call to action. The resulting conference, held in February, addressed new approaches to climate change, biodiversity, pollution, environmental health, water, environmental governance, and changing patterns of production and consumption. Within the nine points of the Paris Call for Action that inspired the meeting was the proposal for a Universal Declaration of Environmental Rights and Duties (the right to a sound environment) and the transformation of UNEP into a WHO-like organization to be called the United Nations Environment Organization. Green Cross International renewed its call for the adoption of an international legal instrument that would assure the right to water. Environmental degradation “could even come to jeopardize international peace and security” said UN Secretary-General Ban Ki-moon's message to the conference, and the UN General Assembly President Sheikha Haya Rashed Al Khalifa, addressing the Conference, called for “clear objectives and strong ecological governance at the global level, a concept that continues to elude us.” (February 2007) Ref. 33

**Climate Change a Serious Threat to Security, Conclude Eminent Military Officers**

*National Security and the Threat of Climate Change*, a report by the CNA Corporation, presents the conclusions of an eminent Military Advisory Board (consisting of retired senior military officers and national security experts) on the security implications of climate change. The report looks at the geo-strategic implications of climate change in general and its effects on international security. It explores specific regional security challenges in Africa, Asia, the Middle East, Europe, and the Americas; discusses the direct impact of some climate change aspects on military systems and operations; and presents a set of findings and recommendations related to mitigation, adaptation, and preparation, as well as policies in response to climate change. It warns that climate change could seriously exacerbate already marginal living standards… causing widespread political instability and the likelihood of failed states…. The chaos that results can be an incubator of civil strife, genocide, and the growth of terrorism… The U.S. may be drawn more frequently into these situations, either alone or with allies, to help provide stability before conditions worsen and are exploited by extremists. The U.S. may also be called upon to undertake stability and reconstruction efforts once a conflict has begun, to avert further disaster and reconstitute a stable environment.” Therefore, “The consequences of climate change can affect the organization, training, equipping, and planning of the military services.” (April 2007) Ref. 34


The *Inventory of Environment and Security Policies and Practices* report by the Institute for Environmental Security (IES) in the Netherlands "provides an easy to use comparative overview of existing governmental and inter-governmental positions and actions dealing with the relationship between environment, security and sustainable development." The report describes the environmental security activities of 13 (largely OECD) countries and 7 international NGOs. It also furnishes background information on IES's program, Greening European Security, which focuses on mainstreaming environmental and sustainable development factors into European foreign and security policy. (March 2007) Ref. 35

**New Environmental Security Blog**

The Environmental Change and Security Program of the Woodrow Wilson International Center for Scholars has launched a blog on new security threats. The blog provides frequent updates and commentary on the latest news stories and reports pertaining to environmental security, such as
global water scarcity, climate change and terrorism. (February 2007) Ref. 36

**UN Reform Report Stresses Environmental Issues**
The UN Secretary General has issued an extensive report on UN reform, entitled "In Larger Freedom: towards development, security and human rights for all", with environmental issues cited in all sections. It states “threats to peace and security in the twenty-first century include not just international war and conflict but […] also include poverty, deadly infectious disease and environmental degradation since these can have equally catastrophic consequences.” [para.78] It proposes that the Secretariat include better responses to “humanitarian emergencies and its handling of environmental issues”, that “National investment and policy priorities” improve environmental management and policy reforms, and calls on countries to adopt time-bound environmental targets. “Ensuring environmental sustainability” should be one of the global actions priorities. It specifically requires [para.212] a more coherent framework of global environmental governance, for effective implementation, coordination and monitoring of the over 400 international environmental treaties already in force. This is reiterated in the Annex—For decision by Heads of State and Government calling for a “more integrated structure for environmental standard-setting, scientific discussion and monitoring, and treaty compliance.” The Reform Report will be discussed and adopted at the summit of world leaders in September 2005 at the UN. (March 2005) Ref. 37

**UN Reforms in Development, Humanitarian Assistance, and Environment to be Proposed by High-Level Panel**
The UN Secretary-General has appointed a 15-member international high-level panel to explore how to improve the work and efficiency of the UN system in the areas of development, humanitarian assistance, and environment. The study’s outcomes will be used for the comprehensive UN management reform, complementing such other major reform initiatives as the new Peacebuilding Commission and the new Human Rights Council. The study is expected to be completed by the summer and its recommendations formally presented to the UN General Assembly in September 2006, with possible implementation in 2007. (February 2006) Ref. 38

**Human Security Proposed as Reorganizing Principle for the UN**
The UN was organized 60 years ago around the principle of preventing national wars. Today it should be reorganized around the principle of addressing human security, which would reinvent global governance, proposes former Canadian foreign minister, Lloyd Axworthy. A UN cohesive response system able to rapidly deploy aid when and where necessary is needed now to efficiently respond to current civil conflicts and disasters. (November 2005) Ref. 39

**Environment and Security-The Role of the United Nations**
*Environment and Security-The Role of the United Nations* is a comprehensive report summarizing the outcomes of a Roundtable Conference conducted by the UN Foundation and the Woodrow Wilson Center’s Environmental Change and Security Project. It assesses security by its links to population, water, resources, and climate change and makes recommendations to the UN for a better integration of environment with security issues. It recommends that “The UN Security Council should take a leadership role by making environmental security a priority and moving environmental issues from the technical to the security domain”, and that the UN coordinate international efforts on environmental security in all fields, from trade to water,
climate change, and integrated environmental perspective in all its projects. "By protecting the
earth, the UN Security Council can help preserve the peace," concludes the report. [See also New
Reports Stress the Link between Environment and Security in the January 2005 environmental
security report.] (September 2005) Ref. 40

**Human and Environmental Security - An Agenda for Change**

*Human and Environmental Security - An Agenda for Change*, by Stakeholder Forum for a
Sustainable Future, is a “ground-breaking book, authored by prominent international decision-
makers, tackles the global human security problem across the range of core issues. The authors
identify the causes of insecurity, articulate the linkages between the different elements of human
security, and outline an agenda for engaging stakeholders from across the globe in building the
foundations of genuine and lasting human security for all nations and all people.” (September
2005) Ref. 41

**UN Creates Peacebuilding Commission for Post-Conflict Situations**

The UN established a Peacebuilding Commission to prevent countries emerging from conflict
from falling back into conflict. The 31-member new Commission will be an intergovernmental
advisory organization with membership composed of seven Security Council members
(including the five permanent members), seven members of ECOSOC, five top financial
contributors to the UN, five top providers of military personnel and civilian police to UN
missions, and an additional seven members elected by the General Assembly, with special
consideration for States that have experienced post-conflict recovery. The Commission will act
by consensus, proposing integrated strategies for improving the UN actions of stabilization and
recovery in post-conflict situations. The UN reports that about half of all conflicts over the past
20 years were “re-conflicts” – conflicts that recurred within five years after peace accords.
(December 2005) Ref. 42

**UN Report Recommends Basis for Global Security Consensus**

It is not likely that all UN Member States will agree with all 101 recommendations in the UN
Threats, Challenges and Change; however, it goes further than any UN report thus far to address
the security challenges of the 21st century. Since no State can protect itself wholly by its own
actions, the report provides an agenda to establish collective security. Both national security and
human security are addressed. Environmental degradation, social equity, health, and
transnational organized crime are raised to a par with threats from weapons of mass destruction
and terrorism. The report also addresses UN reform, guidelines for the use of force, and defines
terrorism (which reduces an impediment to creating better international agreements to address
it). (December 2004) Ref. 43

**UNU Institute for Environment and Human Security Founded**

The United Nations University has established an Institute for Environment and Human Security
in Bonn, Germany (UNU/EHS) which aims to provide research-based, policy-relevant advice
and training to enhance the capacity of societies to cope with catastrophic events. As its priority,
UNU/EHS will focus on human and environmental security and vulnerability assessment in
flood plains and deltas with particular emphasis on urban settlements. Its interdisciplinary and
multicultural core team will engage in the development and implementation of research and
training programs. (June 2004) Ref. 44

**UN Legal Counsel, Under-Secretary-General Hans Corell, calls for more focus on state of the environment**
United Nations Legal Counsel, Under-Secretary-General Hans Corell, as he reflected on conventions that passed during his 10 years of UN service, called for more attention to be paid to the condition of the world's environment: "There is a tendency, of course, because of the way some behave, that we are focusing on armed conflicts and the use of arms and issues related to that. What I am actually more concerned about now, since part of my responsibility is the environment, is the status of the globe on which we live," he told at a pre-retirement news conference at UN Headquarters in New York. As an example of achievement, he pointed out the Law of the Sea, which existence prevented many conflicts. (March 2004) Ref.45

**Meeting of OECD Environment Ministers calls for more ambitious policies to meet the environmental targets**
At the 20-21 April 2004 meeting, the OECD environment ministers agreed that more ambitious policies supported by stronger political will are needed to meet the environmental targets that they set for 2010 in the OECD Environmental Strategy. A new Environmental Outlook will also be produced. (April 2004) Ref.46

**UN Annual Treaty Event Produced 93 Actions from 32 Countries**
A special event was held this month [September 2004] at the UN to get countries to speed up the process of their acceptance of international agreements. The focus this year was on treaties that protect civilians, especially during times of armed conflicts. Some 32 countries participated by completing 93 actions--accessions, ratifications or signatures to treaties that protect the rights of civilians, covering subjects from armed conflicts to transnational crime, pesticides and chemicals. (September 2004) Ref. 47

**Conference on Environment, Security and Sustainable Development in The Hague**
*Environmental Security in the 21st Century* was the title of the Conference on Environment, Security and Sustainable Development organized by the Institute for Environmental Security in The Hague, May 9-12, 2004. Attended by senior decision makers and representatives from governments, NGOs, development institutions, the private sector, and academia, the Conference discussed the role of environmental security in making the world a safer and more sustainable place. The conference aimed to find integrated, science-based, diplomatic and legal solutions for increasing environmental security. The Conference’s concluding document, *Pathways to Environmental Security* [not available yet], will include recommendations related to the conference’s objectives. (May 2004) Ref.48

**World’s Largest Environmental Forum to Set Priorities**
About 3000 environmental leaders in government, business, NGOs, universities, and international organizations are expected at the 3rd IUCN World Conservation Congress scheduled to convene in November 2004 in Thailand. It will address the issue of natural resource conservation relative to economic and population growth. The Congress will have three elements: IUCN Commission Meetings, the World Conservation Forum, and the Members Business Assembly. The Commission meetings will set the priorities for conservation work for
the coming four years, addressing species extinction, management of protected areas, laws to conserve nature, ensuring that fair benefits flow to rural people from natural resources, building understanding of how ecosystems function, and improving public understanding of conservation. The World Conservation Forum will discuss and define solutions for problems such as the loss of species and ecosystems, globalization and related health concerns, poverty alleviation, and economic and legal steps to ensure the sustainable use of natural resources. (May 2004) Ref.49

International Conference on Environment, Peace and the Dialogue among Civilizations and Cultures

The International Conference on Environment, Peace and the Dialogue among Civilizations and Cultures, held May 9—10 in Tehran, Iran, was organized by UNEP, Iranian Department of Environment, the United Nations University (UNU), and UNESCO. It discussed and reaffirmed the interaction between environment and conflict, environment and human security, and the role of dialogue in reducing international conflict and protecting the environment. Other issues discussed were: the efficiency of the current international regulations relating to environmental protection during armed conflict; the status of environmental treaties after parties go to war; the applicability of international law to non-international armed conflicts; and UNEP’s possible role in assessing liability for damages. UNEP representative noted the potential of a future UN Peacebuilding Commission to address these issues. The delegates adopted the Tehran Communiqué that provides nine recommendations and conclusions arising from the Conference: to create a culture of universal peace and solidarity; to deepen and broaden the process of dialogue among civilizations and cultures; UNEP should continue its initiative on environment, peace and dialogue and consider holding annual international meetings; improve understanding and correlation between security and environment; enlarge the dialogue to include all segments of society; the proposed UN Peacebuilding Commission should contribute to the objectives of the Conference; development of fora for preventive dialogue and post-conflict restitution; and cultural, ethical and spiritual values must be fully integrated into strategies of dialogue for peace, security and development. The Communiqué will be formally submitted to the UN Secretary-General as a message to the September UN General Assembly. (May 2005) Ref. 50

OSCE-UN Launches Environmental Security Initiative in Southern Caucasus

The Organization for Security and Cooperation in Europe (OSCE), the UN Environmental Programme (UNEP), and the UN Development Program (UNDP) launched the Environmental Security Initiative through a series of consultations in Armenia, Georgia, and Azerbaijan May 10th-18th. The initiative began with consultations among government officials, non-governmental organizations and local and international experts, discussing environmental risk factors that have the potential to hamper security in Armenia. Other workshops focused on the role of environmental security in economic growth and poverty reduction in Georgia and on environmental concerns with security implications in Azerbaijan, including trans-boundary water pollution and freshwater quality as well as contamination of the Caspian Sea and deforestation. The purpose of the Environment and Security Initiative is to eliminate environmental problems that might cause political tensions. (May 2004) Ref.51

Environmental Security Stressed by World Islamic Forum for Dialogue for Inclusion to Proposed International Charter on Values for the United Nations

At a recent conference on religions and cultures, Dr. Hamid ibn Ahmed Al-Rifae, president of
the World Islamic Forum for Dialogue (WIFD) presented WIFD’s proposals for inclusion in a new charter on values. Three fundamental points were stressed: Unity of human family; human dignity and justice; and environmental security. This paper was presented in preparation for the development of an international charter on values to be submitted to the United Nations. (May 2004) Ref.52

Libya Initiates International Conference on Environmental Security for Seas and Oceans
Building on the “Ocean Security Conference” held in the US Congress in May 1997 and the “Towards Enhancement of Ocean Security in the Third Millennium” conference held in the Swedish Parliament in January 1998, the International Conference for the Initiative of Environmental Security of Seas and Oceans was held in Tripoli, Libya, 23-25 July 2005 as the first of three international conferences on the Ocean Security Initiative. It was organized by the Advisory Committee on Protection of Seas and Oceans (ACOPS) under the patronage of the Gadhafi International Foundation for Charities Associations and the Environmental General Authority of Great Jamahiriya. Ocean environment and security experts from 26 countries representing governments, international organizations, NGOs, and the private sector participated. The conference addressed the environmental security issues relating to the seas and oceans from a broad perspective ranging from illegal immigration to transnational organized crime. Participants stressed that international and trans-institutional collective action was required to assure compliance with international terms and standards for improved ocean environmental security. (July 2005) Ref. 53

Pacific Islands Forum Summit in October 2005
The Pacific Islands Forum Summit will be held on October 27, in Papua New Guinea. It will be preceded by the Small Island States Summit and the Pacific ACP (African Caribbean Pacific) Leaders Summit, and the Pacific leaders' retreat on October 25-26, and followed by a post-forum dialogue meeting on the 28th and 29th. The Forum’s topics will include Pacific regional security, aid, policing, peacekeeping, money laundering, arms trading, HIV-AIDS, resource management of commodities and fish stocks, and regionalized governance. It will be attended by the prime ministers of Australia, New Zealand, Fiji, Samoa, Tonga, Cook Islands, PNG, Tuvalu, Vanuatu, Nauru, French Caledonia, and other islands states, as well as representatives of the EU, the UN, United States of America, China and Japan. Parallel with the official forum will be meetings of NGOs representing stakeholder groups and lobbyists. [See also Asia and Pacific Countries Adopt Declarations on the Environment of March 2005 environmental security report] (August 2005) Ref. 54

Environmental Role for Army Increasing
The growing trend of governments to use the military in peacetime for enforcing environmental legislation indicates an increased recognition that environmental conditions are an essential part of national security.

Chinese Army Environmental Role Increases
A recent statement by a senior military official has identified environmental protection as a security role of the Chinese military. (April 2004) Ref.55
Environmental Role for Army in Brazil
Brazil has established an agreement between its environmental and defense ministries to provide military support to environmental enforcement efforts. Although Brazil has used its army in such a role since the late 1990s, this marks the first time that a formal agreement has been signed outlining the responsibilities of the two agencies in directly addressing deforestation. (July 2004)

On 6 August 2004, the Brazilian Institute of the Environment and Renewable Natural Resources and the Army Command of Land Operations signed an agreement for the Army to provide logistic support and guarantee the security of operations to monitor, control, and combat deforestation in the Amazon. In addition, approximately 0.5% of Brazil’s total defense budget has been allocated for this effort. (August 2004) Ref. 56

Note: A report by Conservation International reveals that Brazil's tropical savanna is disappearing at a faster rate than Brazil's Amazon and Atlantic rain forests and might disappear by 2030 if current clearing practices continue. This environmental group will meet with Brazil’s government at the end of July to further discuss the situation.

Environmental Role for Army in Lebanon
A recent editorial in a Lebanese newspaper called for the Lebanese Army to take on an environmental role in the country in the absence of a wartime mission. (July 2004) Ref. 57

Former EPA Administrator Calls for U.S. Leadership in Environmental Protection
At the conference on the Making of Environmental Law at the Woodrow Wilson International Center for Scholars, Russell E. Train, former Administrator of the Environmental Protection Agency, presented his recent book, Politics, Pollution, and Pandas, and called for US leadership in this field. Although the U.S. was the world leader in environmental protection in the 1970s, he said, it is now widely viewed as a laggard or even as an impediment to progress. With other panelists at the conference, he urged the need for new US leadership in environmental protection. (September 2004) Ref. 58

U.S. Congressman Leach Calls for New Actions to Address Asian Environmental Security Problems
Representative James A. Leach, chairman of the Subcommittee on Asia and the Pacific of the House International Relations Committee, said before the committee September 22, 2004 that, “By almost any objective measure, it would appear the scale of the environmental challenges in Asia demands a more robust response from countries within the region as well as the international community,” and he invited policy input. (September 2004) Ref. 59

Somali Piracy is also an Eco-terrorism Threat
The rise of piracy in Somalia’s waters raised serious environmental and potential eco-terrorism concerns after the hijacking on November 15, 2008 of the large Saudi oil tanker, Sirius Star, reported to contain 2 million barrels of crude oil. While piracy may not present a direct threat to countries’ national security, its consequences could have widespread effects. Nevertheless, the integrity of the international efforts to tackle piracy in the region (the UN Security Council resolution, the EU one-year “Atalanta” anti-piracy mission, and international coalition forces patrolling the region) is seriously undermined by allegations that the EU and Asian countries are unwilling or unable to stop companies that have been dumping toxic waste off the Somali coast for many years. The UN special envoy for Somalia, Ahmedou Ould Abdallah, has in the past few
months repeatedly warned about illegal fishing and toxic dumping by European firms off Somalia’s coast. [See also Toxic Waste Disposal of Global Growing Concern in September 2006 and other related items in previous environmental security reports.] (December 2008) Ref. 60

**Environmental Security Focus of the Nobel Peace Prize for 2007**

The Nobel Committee said it wanted to bring into sharper focus the “increased danger of violent conflicts and wars, within and between states”, posed by climate change. As a result, the Intergovernmental Panel on Climate Change (IPCC) and Al Gore were awarded the Nobel Peace Prize 2007 “for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change.” Awarding this year’s Nobel Peace Prize for climate change work and the 2004 Prize to Wangari Maathai “for her contribution to sustainable development, democracy and peace” compellingly acknowledges the importance of the environmental issue to international security. (October 2007) Ref.61

**Branson calls for War Room on Climate Change at the United Nations**

During the special UN General Assembly session “Addressing Climate Change: The United Nations and the World at Work,” Sir Richard Branson, chairman of the Virgin Group, offered a $25 million prize for technology to clean CO2 from the atmosphere and challenged the world to help him create a war room to manage the attack on climate change. Although it would be independent of the UN, it would include the participation of the UN, corporations, governments, NGOs, and universities in its design, information systems, and management. Key themes of the General Assembly speeches were: 1) partnerships among UN, government, business, NGOs, and universities; 2) global alliances for action; 3) better UN coordination to address Climate Change; 4) rich nations pay for poorer nations’ adaptations to meet climate change challenges (since the poorer countries contribute the least to greenhouse gases, but will suffer the most from global warming; hence, the richer nations should pay for the poorer nations adaptation measures); 5) need for a global long-term strategy; 6) shared but differential responsibilities among nations to address climate change; 7) technology transfer and issues of intellectual property rights; 8) early warning systems for adaptation; and 9) “it is too late to say later.” (February 2008) Ref.62

**Reports Stressing the Link between Environment and Security** (Ref.63)

*Human Development Report 2007-08. Fighting climate change: Human solidarity in a divided world.* The 2007-08 edition of UNDP’s Human Development Report focuses on the threat of climate change. Climate change, according to the report, is the ‘defining human development challenge of the 21st Century’ and the world must take actions today to avoid catastrophic consequences. For example, by 2080 an additional 600 million people in sub-Saharan Africa could suffer from malnutrition due to climate change, and a 3–4°C increase in global temperature could result in 330 million people being permanently or temporarily displaced through flooding. Pointing to the fact that the poorest are most vulnerable and suffer the earliest and most damaging setbacks, the report warns that actions taken—or not taken—in the years ahead will have a profound bearing on the future course of human development. (November 2007). Ref.64

*A Climate of Conflict* by the London-based International Alert conflict resolution group analyzes the possible link between climate change and conflict. The report warns that unless adequate and timely adaptation policies are implemented, more than half of the world's nations are at risk. It
identifies 46 countries—home to 2.7 billion people—at high risk of armed conflict, while another 56 states—with a total population of 1.2 billion—are at risk of political instability. Fragile states have particular vulnerability; therefore, reconstruction policies should include environmental and climate change adaptability strategies, underlines Dan Smith, Secretary General of International Alert. (November 2007) Ref.65

*The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change,* by the Center for Strategic and International Studies and the Center for a New American Security presents the possible security implications of climate change by three plausible scenarios:

- **scenario 1:** Expected Climate Change to 2040 (based on the medium IPCC projections, temperature rise 1.3°C above 1990 levels and sea level rise 0.23m);
- **scenario 2:** Severe Climate Change to 2040 (more severe warming at 2.6°C and 0.52m sea level rise has exponentially more devastating effects on agriculture, ecosystem and population, and water scarcity is affecting 2 billion people);
- **scenario 3:** Catastrophic Climate Change to 2100 (an expansion of Scenario 2 from 2040 to 2100, assuming average global temperature rises of 5.6°C above 1990 levels, mountain glaciers virtually gone, and sea level rise by 2 m relative to 1990, rendering low-lying coastal regions uninhabitable, and severely affecting all areas of life and ecosystems).

The report includes a Summary of key environmental and national security implications of the three scenarios, which “makes clear, climate change has the potential to be one of the greatest national security challenges that this or any other generation of policymakers is likely to confront.” (November 2007) Ref.66

The *10th anniversary report* of the Woodrow Wilson Center Environmental Change & Security Project highlights the fundamental role of the environment for global peace building. Top thinkers identified and analyzed key themes with crucial impact on conflict prevention over the next ten years: population, environment, and health. UNEP executive director, Klaus Toepfer, said that “Environmental security is the disarmament policy of the future.” (January 2005) Ref.67

*World Watch Institute State of the World 2005: Redefining Global Security* calls for new approaches to global security by addressing poverty, disease, and environmental decline, “the true axis of evil” as stated by the Institute’s president, Christopher Flavin. (January 2005) Ref.68

*The Optimist,* Green Cross International’s magazine (now available online), is highlighting current problems and opportunities for achieving sustainable and equitable development as the true path towards global peace and security. With articles ranging from the environmental legacy of the Cold War to cultural and poverty issues, it covers the wide landscape of security components. (January 2005) Ref.69

*Outgrowing the Earth: The Food Security Challenge in an Age of Falling Water Tables and Rising Temperatures,* the new book by Lester R. Brown, Founder and President of the Earth Policy Institute, investigates the impact of water shortage and climate change on food security and implicitly security in general. The book also suggests some practical steps to overcome food shortage and its implications. (January 2005) Ref.70

World Wildlife Fund's *The Living Planet Report 2004* examines humanity’s ecological footprint, and the state of nature and resource use in 149 countries. It reveals that humanity is running an
“ecological debt,” consuming over 20 percent more natural resources than the Earth can produce, destroying ecological balance, depleting groundwater, and damaging biodiversity. The report urges us to live within the means of our planet, and adopt and implement policies to reverse the ecological debt trend: increase biocapacity; reduce world population; diminish per person consumption; and improve resource efficiency. The WWF is urging governments to reduce the rate of biodiversity loss by 2010 and create national and regional targets for creating networks of protected areas to safeguard biodiversity, as agreed at several UN Summits. (October 2004) Ref.71

Environment and Security: Transforming Risks into Cooperation – The Case of the Southern Caucasus, highlights the link between environment and security in the Southern Caucasus, arguing that environmental degradation and competition for natural resources could worsen the situation in this area already vulnerable to conflicts. The report gives an overview of human security in the regional context and then looks at specifics for the three countries, Armenia, Azerbaijan, and Georgia. It examines both the negative effects of conflict in the region and the opportunities environmental issues present for cooperation and confidence building. The report is part of the Environment and Security Initiative (ENVSEC). (October 2004) Ref.72

Blood and Soil: Land, Politics and Conflict Prevention in Zimbabwe and South Africa by the International Crisis Group (ICG) analyses the link between land reform in the region and instability and violence, offering practical policy suggestions. (October 2004) 73

A more secure world: Our shared responsibility. Report of the High-level Panel on Threats, Challenges and Change
It is not likely that all UN Member States will agree with all 101 recommendations in the UN report: A more secure world: Our shared responsibility. Report of the High-level Panel on Threats, Challenges and Change; however, it goes further than any UN report thus far to address the security challenges of the 21st century. Since no State can protect itself wholly by its own actions, the report provides an agenda to establish collective security. Both national security and human security are addressed. Environmental degradation, social equity, health, and transnational organized crime are raised to a par with threats from weapons of mass destruction and terrorism. The report also addresses UN reform, guidelines for the use of force, and defines terrorism (which reduces an impediment to creating better international agreements to address it). (December 2004) Ref.74

Environment and Security—The Role of the United Nations is the summary report of a panel of experts in the fields of water, climate change, and natural resources who assessed the link between environment and security and how the UN could prevent environment-related conflict, and even use the environment to build peace between nations. The report suggests that the UN more efficiently integrate the environment into its security agenda and recommends that the “Security Council mainstream environmental issues into its security operations, add environmental conflict experts to its staff, and facilitate sharing conflict-related environmental data and analysis across UN agencies.” The report is part of the UN Foundation's United Nations and Global Security Initiative. (September 2004) Ref.75

UNEP's latest report, Understanding Environment, Conflict, and Cooperation was launched by
Klaus Toepfer at the conference, Environment, Development, and Sustainable Peace: Finding Paths to Environmental Peacemaking, held at Britain's Wilton Park, September 16-19. The report features papers by several environmental security experts, analyzing different aspects of the link between environment and conflict, institutional implications, early warning, and opportunities raised by environment and security initiatives. (September 2004) Ref.76

Emerging Forces in Environmental Governance. A recent book published by the United Nations University presents arguments for overhauling international environmental governance. It argues that a new environmental coordinating body is needed to solve problems associated with the proliferation of multiple organizations that administer various treaties, conduct research, and maintain the information required to ensure consistent enforcement of existing international environmental agreements. Enforcement options presented include creation of a World Environment Court, a UN Environmental Security Council with binding enforcement powers, and expansion of the UN Security Council mandate to include environmental security. (June 2004) Ref.77

South Asia in the World: Problem Solving Perspectives on Security, Sustainable Development, and Good Governance, UNU Publication. This 460-page book analyses South Asian regional economic, social, security, and environmental issues. Several chapters are dedicated to security issues, and two chapters specifically address environment and security related issues: “Environment: Critical links between environment and development in South Asia” and “The environmental challenge to human security in South Asia” (June 2004) Ref.78

World Health Organization (WHO) updated Guidelines for Drinking-water Quality recommends a completely new approach to water management, shifting from reactive action (responses to outbreaks), to preventive action, by managing drinking water quality in a holistic, systematic way: from source to tap. (September 2004) Ref.79

INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS


Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006, almost three years after it was adopted. The Protocol stipulates that Parties should take “remedial measures to mark and clear, remove or destroy unexploded ordnance or abandoned explosive ordnance” as early as possible after hostilities have ended, whether they control the territory or not, by cooperating directly or indirectly with all parties involved through quick and accurate information exchange. The Protocol is not retroactive, covering only wars occurring after its entry into force. As of the end of November, there were 27 States Parties to the Protocol. The Portfolio of Mine Action Projects 2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of cluster bombs and other explosives. In 2007, the focus of the Projects will be on unexploded ordnance, aiming to deal with the aftermath of conflicts that took place before Protocol V entered into force. (November 2006) Ref. 80
Protocol on Explosive Remnants of War to the Convention on Certain Conventional Weapons
A new Protocol on Explosive Remnants of War (ERW) recommended by the Group of
Governmental Experts on ERW and Mines Other Than Anti-Personnel Mines (MOTAPM) was
adopted at the 28 November Meeting of the States Parties to the Convention. It became
Protocol V on Explosive Remnants of War, annexed to the Convention on Certain Conventional
Weapons (CCWC). The text of the new Protocol is contained in Annex II of the Report—
CCW/GGE/VI/2. The Group will continue its work in 2004 on the issue of ERW focusing on the
implementation of existing legislation and studying possibilities of improving the design of
certain specific types of munitions, including sub-munitions to minimize the humanitarian risks
if/when they become ERW. (November 2003) Ref.81

Protocol on Prohibitions or Restrictions on the Use and Transfer of MOTAPM
Another protocol under negotiation being considered for submission to the next Meeting of the
States Parties to the Convention is the Protocol on Prohibitions or Restrictions on the Use and
Transfer of MOTAPM. (November 2003)82

OSCE document on Stockpiles of Conventional Ammunition is a politically binding
international instrument that addresses risks arising from ammunition stockpiles
Foreign Ministers of 55 countries endorsed the OSCE Document on Stockpiles of Conventional
Ammunition. It is a politically binding international instrument that addresses risks arising from
surplus stockpiles of all categories of conventional ammunition, explosive material and
detonating devices, stock surpluses that can cause environmental problems and hazards to
populations. The document could serve as a valuable reference and tool for other organizations,
including the United Nations and will be disseminated to the OSCE's Partners for Co-operation,
which include Afghanistan, Japan, The Republic of Korea and Thailand, as well as to the
Mediterranean Partners for Co-operation, Algeria, Egypt, Israel, Jordan, Morocco and Tunisia.
(December 2003) Ref.83

Ocean Dumping of Chemical Weapons might be addressed by international agreements
Since WWII, several nations, including the US, have disposed of chemical munitions by
disposing of them at sea. Each year, several stories appear in the media about these munitions
being caught in fishermen’s nets. Recognizing the potential threat of contamination of fish
supplies, several countries have been monitoring known dumping sites and attempting to map
suspected dumping sites. Recently, environmental interest groups have begun to take interest in
the issue, calling for the recovery of these abandoned munitions. Although no treaty currently
requires the recovery of these munitions, interest on the part of governments is increasing with
respect to how to minimize the hazard and mitigate any significant release of chemical agents
into the waters surrounding dumping areas. Since the UN has been consistent in recent years in
its interest in long-term and widespread contamination issues, it is reasonable to expect
international agreements to address this issue. (January 2004) Ref.84

UN Nuclear Terrorism Convention Entered into Force on July 7, 2007
The International Convention for the Suppression of Acts of Nuclear Terrorism enters into force
on July 7, 2007; about two years after Member States adopted it, in April 2005. It is one of the
measures to reduce risks posed by nuclear, biological, and chemical weapons, and is the 13th
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international instrument on terrorism. The Nuclear Terrorism Convention creates an international legal framework that will help countries enhance their nuclear security and collaborate to prevent terrorist groups from gaining access to nuclear material. It should also add strength to the Global Counter-Terrorism Strategy. As of the end of June, the Convention has 115 signatories and 23 Parties. [June 2007] Ref. 85

UN Convention against Nuclear Terrorism
The International Convention for the Suppression of Acts of Nuclear Terrorism was adopted by the General Assembly on April 13, 2005 and will be open for signature on 14 September at the high-level plenary meeting scheduled for the 60th session of the UN General Assembly. The Convention creates an enforced legal framework to counter nuclear terrorism. It will provide for a definition of acts of nuclear terrorism, and covers nuclear safety, crisis and post-crisis situations in accordance with the International Atomic Energy Agency (IAEA) standards. Under its provisions, States are supposed to cooperate by sharing information and assisting each other in preventing terrorist attacks, and the alleged offenders must be prosecuted or extradited. (April 2005) Ref. 86

Nuclear Nonproliferation Treaty Stalemate Continues
No progress was achieved by the two-week annual session for preparing the 2010 NPT Review Conference. After having its work delayed for six days due to Iran’s disagreement with the agenda, the conference ended with disputes over the session’s final statement. Iran and other Nonaligned Movement nations criticized the statement as being too focused on compliance and not enough on the need for nuclear-weapon states to move toward disarmament. [See also Review Conference of the Non-Proliferation Treaty, and Increasing Calls for Improved Management of Nuclear Materials and Nonproliferation] Meanwhile, eight more nations joined the Global Initiative to Combat Nuclear Terrorism. Led by Russia and the U.S., this global effort was initiated in 2006, to improve security over nuclear materials and to deter nuclear smuggling. The group now includes 31 nations. The next meeting is scheduled to be held in June, in Kazakhstan. (May 2007) Ref. 87

The Convention on Cluster Munitions

The Convention on Cluster Munitions Opens for Signature on December 2nd
The Convention on Cluster Munitions (CCM) will be open for signing at a special conference in Oslo, December 2–4, 2008. The CCM prohibits the use, development, production, stockpiling, and transfer of cluster munitions. It was adopted at the Dublin Diplomatic Conference on Cluster Munitions in May 2008. [See also International Convention on Cluster Munitions Adopted by 111 Countries in May 2008 and other related items in previous environmental security reports.] (November 2008) Ref. 88

The Cluster Munitions Treaty Signed by 94 Nations
94 nations signed the new international treaty banning cluster munitions at a special conference in Oslo December 3–4, 2008. The agreement will become binding international law six months after 30 signatories have ratified it. Four countries have already ratified it: the Holy See; Ireland; Norway, and Sierra Leone. The treaty forbids states parties to produce, trade, and use cluster
munitions, as well as requiring them to discourage other nations from using cluster munitions in joint military operations. Dozens of countries that signed are stockpilers, former producers, and users of the weapon, including 18 of 26 NATO nations, such as the UK, France, and Germany. The number of signatories is expected to increase rapidly. (December 2008) Ref. 89

International Convention on Cluster Munitions Adopted by 111 Countries
The Convention on Cluster Munitions was formally adopted by 111 countries in Dublin, Ireland, on May 30, 2008. The Convention is a legally binding instrument that outlaws the use, production, transfer, and stockpiling of cluster munitions, and commits countries to clear areas contaminated by cluster munitions and assist victims and affected communities. The President of the International Committee of the Red Cross, Jakob Kellenberger, urged all countries to adhere to the Convention and noted “these weapons are not only morally unacceptable but also now illegal under international humanitarian law.” The Cluster Munitions Convention will be opened for signature in Oslo, December 2-3, 2008, and will enter into force after 30 ratifications. The U.S., China, and Russia did not participate in the meeting. [See also Negotiations Continue for an International Instrument to Ban Cluster Munitions in November 2007 and other related items in previous environmental security reports.] (May 2008) Ref.90

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Negotiations Continue for an International Instrument to Ban Cluster Munitions
Cluster munitions were the focus of the Convention on Certain Conventional Weapons (CCW) meeting held in Geneva this month that resulted in a weak mandate with no legally binding document or language referring to cluster bomb prohibition or timeline. The EU’s proposal to negotiate a treaty in 2008 banning cluster munitions was rejected. UN Secretary-General Ban Ki-moon underlined in his message to the delegates the necessity of a legally binding international instrument that would prohibit the use, development, stockpiling and transfer of cluster munitions; while promoting the destruction of current stockpiles, battlefield clearance and risk mitigation activities. This is consistent with the aim of the Oslo Process to negotiate a ban on cluster munitions. On November 5, the Global Day of Action to Ban Cluster Bombs, public actions took place in 40 countries, calling on governments to take actions for banning cluster munitions. Supporters hope that momentum was created to advance the negotiations next month, when more than 100 countries will gather in Vienna to discuss a draft treaty. [See also Progress Made on Banning Cluster Bombs in March 2007 and other items on this theme in previous environmental security reports.] (November 2007) Ref.92
Progress Made on Banning Cluster Bombs
At the Conference on Cluster Munitions held in February 2007 in Oslo, 46 states and several international organizations decided to develop, by 2008, a legally binding international instrument to ban the use, production, transfer, and stockpiling of cluster munitions, as well as to create a framework for dealing with the consequence of cluster munitions’ use in the affected areas. Environmental damage and civil casualties are the highest concern for banning cluster bombs. Next meetings are planned for May/June in Lima, November/December in Vienna and early 2008 in Dublin. Last year Belgium has become the first country to ban cluster bombs, and this month [March 2007] the Belgian Senate passed legislation that criminalizes investment in companies that make cluster munitions. The Belgian Parliament plans to publish a list of companies that manufacture such munitions. Austria announced a moratorium on the use, production, or trade of cluster munitions. Canada promised to destroy its stockpile of cluster munitions. The U.S. Democrats recently introduced a bill in the U.S. Senate proposing to “restrict federal funds for the use, sale or transfer of cluster bombs.” Presently there are 34 countries producing cluster munitions and about 75 countries that stockpile them. [See also related items CCW Protocol V on Explosive Remnants of War Entered into Force in November 2006, NGOs Launch Campaign to Ban Cluster Bombs, and Draft Protocol on Cluster Bombs Cleanup Liability] (March 2007) Ref. 93

African Countries Call for International Ban on Cluster Bombs
The first meeting of African countries on cluster bombs adopted the “Livingstone Declaration,” endorsed by 38 out of 39 countries (South Africa, one of the continent’s two producer states was the exception.) The strong political declaration is formally committing the African countries to the negotiations for a global cluster munitions ban treaty to be held in Dublin, Ireland, May 19-30, 2008. There was widespread support for a broad definition of cluster munitions to avoid exceptions based on so-called ‘technical fixes,’ and on the need for comprehensive liability provisions for the affected communities. The Dublin meeting should conclude the Oslo process and agree on the final terms and language of a cluster bombs ban treaty, which would then be opened for signature before the end of 2008. [See also Negotiations Continue for an International Instrument to Ban Cluster Munitions in November 2007 and other items on this issue in previous environmental security reports.] (April 2008) Ref 94

NGOs launch campaign to ban cluster bombs
The Cluster Munition Coalition, involving NGOs from around the world, launched a campaign aiming to ban, under international law, the use of cluster bombs. The campaign also calls for help for victims and an overall cleanup of explosive remnants. Several governments - including the Netherlands, Canada, New Zealand and Mexico support the campaign. The campaign has two aims: embedding in international law the responsibilities of parties with regard to ERW, and binding the use of cluster munitions (CM) by universal humanitarian standards. Regarding CM, the campaign aims to restrict use and production, as well as trade in cluster munitions. (November 2003) Ref.95

Global Zero, a New Initiative for Promoting Global Nuclear Disarmament
Global Zero is a new effort launched by international leaders—including former heads of state and top diplomatic and defense officials—to eliminate all nuclear weapons worldwide within 25
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years. It wants to encourage the international community to establish safeguards and audits for disarmament, using dialogs and strategies different from past approaches. The group plans to organize a global meeting in January 2010, prior to the Nuclear Non-Proliferation Treaty Conference to be held in May 2010. Meantime, the EU also aims to be a leader in nuclear disarmament, suggesting new measures, including a worldwide prohibition on nuclear tests. [See also Nuclear Safety in September 2007 and other related items in previous environmental security reports.] (December 2008) Ref. 96

Chemical Weapons Convention Gets New Boost
The Second Review Conference for the Chemical Weapons Convention was held in The Hague, April 7-18, 2008, attended by delegates from 114 of the 183 treaty states. The main issues brought up by participants were: threats posed by the use of chemical weapons by nonstate actors; deadlines for chemical weapons destruction (specifically named were Russia and the U.S., which have to destroy their chemical warfare agents by April 29, 2012, and Japan for destruction of its chemical weapons stockpiles in China); and universal adherence to the treaty. Delegates produced a report that reviews the treaty procedures and implementation issues, and urges the 12 countries that are not yet Party (Angola, the Bahamas, Dominican Republic, Egypt, Guinea-Bissau, Iraq, Israel, Lebanon, Myanmar, North Korea, Somalia and Syria) to join the international disarmament and nonproliferation treaty “as a matter of urgency and without preconditions.” The report does not address the convention’s relation to some new science and technology developments that could produce new threats—such as development of new incapacitating agents, advances in biology and nanotechnology, and industry verification mechanisms. It was proposed that, from now on, the Scientific Advisory Board of the Organization for the Prohibition of Chemical Weapons meet twice a year, not just once as it has previously. [See also New Concerns Rising over Chemical Weapons in April 2007 and other related items in previous environmental security reports.]

In the meantime, Pacific Consultants International warns that Japan is not on schedule for meeting its obligations towards China in the recovery and destruction of hundreds of thousands of chemical weapons abandoned at the end of World War II and will most probably not meet the April 2012 deadline, due to management problems. [See also Japanese Chemical Weapons Cleaning in China Yet to be Completed in June 2007, and other previous environmental security reports on this issue.] (April 2008) Ref 97

The Meeting of Experts to Strengthen a Global Ban on Biological Weapons focused on addressing the legal framework necessary for implementation and enforcement of the Convention’s requirements
The Meeting of Experts was held in preamble to the annual meetings of the States Parties to the Biological and Toxin Weapons Convention (BTWC) as set by the Fifth Review Conference of the treaty [see Strengthen a global ban on Biological Weapons issue in AC/UNU Millennium Project November report]. The experts from 150 States Parties and UN World Health Organization (WHO) and Food and Agriculture Organization (FAO), focused on addressing the legal framework necessary for implementation and enforcement of the Convention’s requirements, and security mechanisms concerning pathogenic microorganisms and toxins. The outcomes of the meeting constituted the input to the annual meeting of States Parties to BTWC held in November 10-14, 2003.
Note: Referring to "genetic bombs", a recent article, is warning that "advanced forms of biological warfare that can 'target' specific genotypes may transform biological warfare from the realm of terror to a politically useful tool." (August-September 2003) Ref.98

NATO Creating a special chemical, biological, radiological, and nuclear (CBRN) unit
NATO is creating a special chemical, biological, radiological, and nuclear (CBRN) defense unit with assets from 13 member nations, including the United States. The Czech army, renowned for its expertise in weapons of mass destruction defense, will be responsible for training the unit. The unit will operate both independently and as part of the new NATO Response Force. Once a nation's CBRN troops have gone through the training, they will be on call from their home country, on a rotational basis, by NATO command for quick deployment abroad. (February 2004) Ref.99

U.N. Monitoring, Inspection and Verification Commission (UNMOVIC) might become a permanent agency to investigate biological and missile programs worldwide

Former chief U.N. weapons inspector, Hans Blix, recently suggested that the U.N. Monitoring, Verification and Inspection Commission (that searched for weapons of mass destruction in Iraq prior to the war), could become a permanent U.N. inspections body with a "more active role that the UN Security Council envisages for itself in the sphere of weapons of mass destruction". In another address, Blix urged the U.S. to better share data and information with the U.N. teams. (June 2004)

The U.N. Monitoring, Inspection and Verification Commission (that searched for weapons of mass destruction in Iraq prior to the war) was suggested to become a permanent agency to investigate biological and missile programs worldwide. The project is supported by Britain, France, Canada, the European Union and Russia. As funding is the biggest impediment, there are suggestions to make it a permanent section of the U.N. Secretariat, or an organ of the Security Council. (November 2003) Ref.100

Agent Orange Study May Spur Chemical Bans and New Claims

A conceptual framework and geographic information system (GIS) software package was developed to assign exposure opportunity indexes to troops, locations, or individuals to herbicides (such as Agent Orange in Vietnam) by Columbia University for the US National Academy of Sciences. The model takes into account factors such as herbicide type, locations and amounts of application, and troop movements to generate a quantitative estimate of exposure and likely health effects. The model helps individuals determine their proximity to spraying and corresponding health risks. The researchers also found that about seven million liters, or ten percent more than previously thought of the dioxin-containing Agent Orange defoliant was used. The finding prompted Vietnam to call on the US to provide aid to help victims stating, “the U.S. has a moral responsibility for this.” The US does not provide compensation to Vietnamese victims, but funds multi-million dollar health programs in general. (April 2003) Ref.: 101

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1 The Genetically Modified Bomb, Thom Hartmann (http://www.commondreams.org/views03/0910-15.htm)
EU Chemical Policy Reforms’ supporters ask US government not to undermine their efforts

Over 70 health and environmental organizations have written to the US government, accusing it of “intervening in the regulatory process of sovereign nations at the behest of the industry”, and urging it to cease efforts to undermine EU chemicals policy reforms. Key elements of the proposed changes include: introduction of the REACH system to Register, Evaluate and Authorize new Chemicals; the obligation for the chemical industry to provide safety data and risk assessments of new chemicals; and provisions to reduce animal testing. The US chemical industry and the Bush administration are opposed to these changes.

Note: The REACH system proposals have been revised in response to criticism from the chemical industry and from the leaders of France, Germany and the United Kingdom. The recently released new draft lightens the burden on industry and clarifies previously vague provisions concerning manufacturers and importers and the "duty of care" to avoid open-ended liability claims. Also, industry concerns over stricter protection of confidential business information is better addressed. (August-September 2003) Ref.102

Nuclear-Free Zones

Nuclear-Free Zones are multiplying all over the world showing humanity’s commitment to ban nuclear weapons. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. Nuclear–free zones include the Antarctic, Africa, Latin American and the Caribbean, South Pacific, South Asia, and Mongolia. Currently Central Asia, Central Europe, South Asia and the Peninsula of Korea, and the Middle East are in negotiations for their own free zones. Ref.103, 104

The Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL) has presented a paper: What means Nuclear-Weapon-Free Zones? which specifies some principles to be considered in the existent and future NWFZ treaties such as: applications during wartime as well as peacetime; prohibition of peaceful nuclear tests; prohibition of military attacks on nuclear facilities of Member States; extension of denuclearization to the maritime areas adjacent to Member States; and new international enforcement mechanisms for possible cases of violating the treaties (such as the Bangkok Treaty mentions).Ref.105

The Nuclear Nonproliferation Treaty (NPT) has 188 states parties; only India, Pakistan, Israel and North Korea are not parties to the NPT. There is international consensus that the gravity of the increasingly serious threat to the treaty and international security posed by the proliferation of weapons of mass destruction –nuclear, biological and chemical – reinforces the need to strengthen the treaty.

Central Asia agrees to become a Nuclear Free Zone

Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzstan and Turkmenistan agreed to become the world's next nuclear weapons-free zone after five years of negotiations. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. This is the first such agreement to be negotiated under the UN. It is expected to be signed by the end of this year. Other nuclear free zones include the Antarctic, Africa, Latin America,
South Pacific, South Asia, and Mongolia. Currently Central Europe, South Asia and the Peninsula of Korea, and the Middle East are in negotiations for their own free zones. (October 2002) Ref.106

*Cuba’s ratification of the Treaty of Tlatelolco completes Latin American and the Caribbean Nuclear Weapons Free Zone*

Cuba was the last of 33 eligible states to ratify the Treaty of Tlatelolco October 26,2002, which establishes a nuclear weapon-free zone in Latin America and the Caribbean. (October 2002) Ref.107

*Central Asia Becomes Nuclear Weapon-Free Zone*

With the Kazakh Senate approving the Central Asian Nuclear Weapon-Free Zone treaty, and Kazakhstan President Nursultan Nazarbayev expected to ratify it shortly, Central Asia—including Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan — becomes a nuclear weapons-free zone, with the parties banning the possession as well as stationing of other nations’ nuclear weapons on their territories. (December 2008) Ref. 108]

**CONFLICT AND POST-CONFLICT ENVIRONMENTAL SECURITY ISSUES**

The cost of military operations to comply with environmental regulations may become so high that the nature of conflict and military operations could change.

“We emphasize the importance of the peaceful resolution of conflicts to avoid situations in which weapons of war degrade the environment and cause irreparable harm directly through toxic agents, radiation, landmines and physical destruction and indirectly destroy agriculture and create vast displacement of people” reads one of the statements adopted at the Global Judges Symposium on Sustainable Development and the Role of Law.3

Long-term environmental degradation caused, in part, by the complete collapse of local and national forms of governance is one of the most serious issues in post-conflict situations.

The UN reports that about half of all conflicts over the past 20 years were “re-conflicts”—those that recurred within five years of peace accords. Many had environmental backgrounds. There is consensus that failed states are the most vulnerable to climate change and possible conflicts due to environment-related issues.

Environmental degradation and hazardous ordnance leftovers in post-conflict areas threaten the livelihoods and health of current and future generations and may constitute an impediment for lasting peace. There should be a “green chapter” in the Geneva Conventions for safeguarding the rights of the environment.

*National Security and the Threat of Climate Change*, a report by a group of high-ranking U.S. military officers and national security experts, warns that “climate change could seriously exacerbate already marginal living standards… causing widespread political instability and the

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3 Global Judges Symposium on Sustainable Development and the Role of Law, convened by UNEP in Johannesburg, 18 to 20 August 2002.
likelihood of failed states.... The chaos that results can be an incu-bator of civil strife, genocide, and the growth of terrorism.”

The military is increasingly called to take part in post-conflict reconstruction efforts and environmental restoration to build stability, as well as in mitigation of environmental effects to avoid conflict. The report entitled *A Climate of Conflict* by Dan Smith and Janani Vivekananda published by International Alert in London warns that unless adequate and timely adaptation policies are implemented, more than half of the world’s nations are at risk. It identifies 46 countries—home to 2.7 billion people—at high risk of armed conflict, while another 56 states—with a total population of 1.2 billion—are at risk of political instability.

Conflict and environmental degradation exacerbate each other. Middle East countries are among the least environmentally sustainable, and conflict has caused massive damages to ecosystems from Iraq to Lebanon and North Africa. Refugees, human rights groups, and legal experts have urged the International Criminal Court to consider human-made environmental crimes along with terror and mass killings in the prosecution of Sudanese officials and Arab Janjaweed. They argue that the crisis was aggravated by the ecological destruction used by the government as a weapon to force people to move. The number of refugees in camps reached 2.2 million and the risk of unrest is increasing as resources are getting exhausted. The deployment and work of the joint UN-African Union force of 26,000 peacekeepers is jeopardized by lack of water. In 2007, an estimated 26 million people were internally displaced by armed conflicts and violence worldwide.

Many post-conflict health and environmental impact assessments are ongoing, as are liability disputes. The Portfolio of Mine Action Projects 2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of cluster bombs and other explosives. Protocol V on Explosive Remnants of War of the Convention on Certain Conventional Weapons came into force in November 2006. The Convention on Cluster Munitions was formally adopted in May 2008, legally binding the use, production, transfer, and stockpiling of cluster munitions and committing countries to clear areas contaminated by cluster munitions and to assist victims and affected communities.

Concerns over the environmental and health effects of the use of depleted uranium munitions are resurfacing and increasing worldwide. The European Parliament adopted a resolution calling on the EU to lead negotiations “through the UN or through a ‘coalition of the willing’” for a global treaty to ban depleted uranium weapons.

Over the past 10 years, only 30% of known chemical weapons stocks have been destroyed. The remaining 70% are supposed to be totally destroyed by 2012 to meet the Chemical Weapons Convention stipulations. Japan is not on schedule to meet its obligations toward China in the recovery and destruction of hundreds of thousands of chemical weapons abandoned at the end of World War II and will most probably not meet the April 2012 deadline. Some experts argue that “nonlethal” materials such as “incapacitating agents” are toxic chemicals that would violate the CWC if used on the battlefield. Clarification of what chemicals will be allowed under the treaty’s exceptions is needed.

There is an international consensus that the “polluter has to pay” with no exemption for the
military. A Geneva Convention for the environment would safeguard the rights of
environment in conflict situation. Numerous studies are being conducted to assess the effect of
different chemicals or other potential polluting materials with long-lasting effects on the
environment and human health. The most “investigated” are the effect of several chemicals (an
increasing number of chemicals are being banned), some metals (i.e. mercury and lead), poison
gas, and nuclear material (mostly depleted uranium used in armor-piercing ammunition).

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adopted. The Protocol stipulates that Parties should take “remedial measures to mark and clear,
remove or destroy unexploded ordnance or abandoned explosive ordnance” as early as possible
after hostilities have ended, whether they control the territory or not, by cooperating directly or
indirectly with all parties involved through quick and accurate information exchange. The
Protocol is not retroactive. The Portfolio of Mine Action Projects 2007 found that 26 out of 29
war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of
cluster bombs and other explosives.

UN Secretary-General on the International Day for Preventing the Exploitation of the
Environment in War and Armed Conflict
In advance of the November 6th International Day for Preventing the Exploitation of the
Environment in War and Armed Conflict, UN Secretary-General Ban Ki-moon urged all nations
to renew their commitments preventing environmental exploitation in war and armed conflict.
“Taking ecological considerations into account is crucial if we are to avoid longer-term
environmental problems that can undermine security and development, and lead to further cycles
of conflict and displacement,” he said in a message and added that massive migrations caused by
conflicts also severely damage the environment. UNEP found that more than 2 million displaced
people since 2003 had caused severe deforestation, land degradation, and overexploitation of
groundwater resources around the larger camps for displaced persons. (October 2007) Ref.109

Environmental Destruction During War Aggravates Instability
On the occasion of the International Day for Preventing the Exploitation of the Environment in
War and Armed Conflict, observed on November 6, UN officials highlighted again that
environmental degradation, mostly destroying natural resources in wartime, worsens conflicts
inside and between nations and re-launched the call for cleanup of the remnants of war. Although
legal protection for the environment during wartime is covered by several existing international
laws, there might be a “need to go further than this piecemeal coverage, and develop clear
standards, appropriate sanctions and credible enforcement mechanisms to ensure that
environmental damage is avoided, deterred or punished. We may well need to add a 'green'
chapter to the long established rules of war set out in the Geneva Conventions” said Kofi Annan,
UN Secretary-General. Klaus Toepfer, Director of the United Nations Environment Programme,
stressed that "Joint projects to clean up sites, agreements and treaties to better share resources
such as rivers and forests, and strengthening cooperation between the different countries'
ministries and institutions may hold the key to building trust, understanding and more stable
relations." (November 2004) Ref. 110
UN Designates November 6th as International Day for Conflict and the Environment
The United Nations has designated November 6 as the “International Day for Preventing the Exploitation of the Environment in Wars and Armed Conflicts.” This designation is the result of UN member states requesting UNEP and the UN Human Settlements Program to monitor the issue. This provides a new avenue for increasing public awareness of environmental impacts of conflict. (November 2002) Ref.: 111

Geneva Convention for Environment
Klaus Toepfer, UNEP’s Executive Secretary, called for the equivalent of a Geneva Convention for the Environment at the Agency’s Governing Council meeting in February: “We have the Geneva Conventions, aimed at safeguarding the rights of prisoners and civilians. We need similar safeguards for the environment. Using the environment as a weapon must be universally condemned, and denounced as an international crime against humankind, against Nature.” He stressed that environmental security had to be a fundamental part of a long-lasting peace policy. In an article written to mark the meeting held from 3-7 February 2003 in Nairobi, Kenya, Toepfer said that the environment is often neglected as "the long-term casualty of war," and went further to recommend that the international community, “…outlaw those who deliberately put the environment at risk in war.” (February 2003) Ref. 112

UNEP may establish a new Secretariat on Environment and Conflict
UNEP held an international meeting to address and assess the impact and link between environmental degradation and political instability, human conflict, and health. A UNEP survey conducted prior to the meeting found that the links between the environment and poverty, trade and conflict were the main "knowledge gaps" in understanding environmental-related issues. This gap will be the focus of the UNEP Governing Council/Global Ministerial Forum to be held in March. As a result, the “UNEP might set up a new secretariat on environmental peace and conflict,” said Dr. Steve Lonergan, Director of UNEP's Division of Early Warning and Assessment. (January 2004) Ref.113

UNEP’s Post-conflict Environmental Assessment may one day get extended to ongoing Environmental Assessments
During the UNEP Governing Council’s Drafting Committee meeting (February 3-7, 2003), the role of UNEP in post-conflict environmental assessment was discussed, including the possibility of environmental assessments of ongoing armed conflicts such as in Israeli-Palestinian conflicts. Although it was agreed to strengthen UNEP’s ability to conduct post-conflict assessments and report to the relevant UN bodies and commissions for further follow-up, it is clear that the potential for assessments in longer-term ongoing conflicts is an emerging issue that could lead one day to international agreements. (February 2003) Ref.: 114

Collateral Damages Caused by Attacks Need to be Redefined
Although precision weapons are seen as reducing collateral damage and reducing conflicts’ duration, a study of precision bombing in Yugoslavia that targeted chemical plants brings into question the definition of “collateral damage.” The Institute for Energy and Environmental Research report of this study argues that, “there is need for a sharp redefinition of how target sets and collateral damage are evaluated…. Currently collateral damage is measured in terms such as
the number of civilian casualties or the cost of replacing property. Long-term environmental harms can be much more difficult to quantify and evaluate, despite their very significant costs."

(November 2002) Ref.: 115, 116

**New Resolution on Victims’ International Human Rights**
The latest Session of the UN Human Rights Commission approved the "Basic Principles and Guidelines on the Right to a Remedy and Reparation for Victims of Gross Violations of International Human Rights Law and Serious Violations of International Humanitarian Law.”

This comprehensive Resolution doesn’t introduce new international obligations, but identifies “mechanisms, modalities, procedures and methods for the implementation of existing legal obligations under international human rights law and international humanitarian law” and reinforces the obligation of all States to respect the international legal obligations and adapt their respective national legal systems to the international laws and regulations on human rights. The Resolution will come into effect after adoption by the Economic and Social Council and the General Assembly, which could occur at the next meeting this September. (May 2005) Ref. 117

**New UN Peacebuilding Commission to Improve Post-Conflict Planning**
The UN Peacebuilding Commission for post-conflict situations held its inaugural meeting on June 23, 2006. The new UN peacebuilding body was created to help prevent countries from falling back into violence, by adopting reconstruction, institution building, and other stabilization and development strategies specific to each country/region emerging from conflict. Since environmental issues are recognized as often being a contributing cause in conflict re-emergence, environment is expected to occupy an important position in the strategies set forward by the Commission. Proposed in 2004 by the Secretary General’s High-Level Panel on Threats Challenges and Change, detailed by the *In Larger Freedom* report, the Commission was endorsed by the 2005 World Summit, and became operational in December 2005. The Commission is an intergovernmental advisory body requiring members to act only by consensus. The Peacebuilding Commission’s membership includes seven members of the Security Council (including its five permanent members); seven States from the Economic and Social Council; five top contributors to the UN budget; five top providers of military personnel and civilian police to UN missions; and seven additional members (that have experienced post-conflict recovery) elected by the General Assembly. (June 2006) Ref. 118

**UN Secretary-General, Kofi Annan, calls for updated laws against environmental damage in war**
November 6th is the International Day for Preventing Exploitation of the Environment in War and Armed Conflict. At its second annual observance this year [2003], Kofi Annan, UN Secretary-General, and Klaus Toepfer, Executive Director of the United Nations Environment Program (UNEP) urged the international community to assess how they could protect the environment in time of war through legal and other mechanisms. "While humankind's ability to wage war continues apace with new and even more potentially devastating weapons," said Toepfer, "international rules and laws designed to minimize the impact on the Earth's life support system have lagged far behind." He also mentioned a recent report commissioned by the German Environment Ministry, which asserts that the Geneva Protocol's requirement of proving "widespread, long-term and severe damage" has rendered it ineffective for environmental protection, as it applies only to "expected damages rather than possible ones" and remains
unenforceable due to a lack of a common definition of these three terms and lack of any
assessment envisioned to be carried out after a conflict. (November 2003) Ref.119

UNEP Post-Conflict Assessment Chairman’s input to UN’s High-Level Panel on Threats,
Challenges, and Change, the Environmental Change and a New Environmental Security
Project at the Woodrow Wilson Center
As a contribution to the United Nations’ High-Level Panel on Threats, Challenges, and Change,
the Environmental Change and Security Project of the Woodrow Wilson International Center for
Scholars (WWICS) launched the project Protecting the Earth, Preserving Peace: Preventing
Environmental Threats to Security. This new WWICS project will invite panels to address three
issues: “What is the link between environment and security? What can be done about it? What
contributions can be made by collective action mechanisms such as the United Nations?”

As part of this process Pekka Haavisto, Chairman, UNEP Post-Conflict Assessment Unit made a
well structured presentation May 25 at the WWICS highlighting the UNEP’s work on post-
conflict assessment, links between environmental conditions and conflict, and NATO countries’
work on techniques and equipment for minimizing environmental damage during conflicts. (May
2004) Ref.120

Conference on Disarmament unable to agree on work program
The U.N. Conference on Disarmament, the sole multilateral forum for disarmament negotiations,
failed again in reaching consensus on a program of work. The adopted annual report requests
that future presidents conduct consultations among member countries during the inter-sessional
period and, if possible, make recommendations considering all relevant proposals and the
outcomes so far. The 2004 sessions are scheduled for Jan. 19 to March 26, May 10 to June 25,
and June 26 to Sept. 10. (August-September 2003) Ref.121

Progress Made on Banning Cluster Bombs
Negotiations Continue for an International Instrument to Ban Cluster Munitions
Cluster munitions were the focus of the Convention on Certain Conventional Weapons (CCW)
meeting held in Geneva this month that resulted in a weak mandate with no legally binding
document or language referring to cluster bomb prohibition or timeline. The EU’s proposal to
negotiate a treaty in 2008 banning cluster munitions was rejected. UN Secretary-General Ban Ki-
moon underlined in his message to the delegates the necessity of a legally binding international
instrument that would prohibit the use, development, stockpiling and transfer of cluster
munitions; while promoting the destruction of current stockpiles, battlefield clearance and risk
mitigation activities. This is consistent with the aim of the Oslo Process to negotiate a ban on
cluster munitions. On November 5, the Global Day of Action to Ban Cluster Bombs, public
actions took place in 40 countries, calling on governments to take actions for banning cluster
munitions. Supporters hope that momentum was created to advance the negotiations next month,
when more than 100 countries will gather in Vienna to discuss a draft treaty. [See also Progress
Made on Banning Cluster Bombs in March 2007 and other items on this theme in previous
environmental security reports.] (November 2007) Ref.122

Progress Made on Banning Cluster Bombs
At the Conference on Cluster Munitions held in February 2007 in Oslo, 46 states and several
international organizations decided to develop, by 2008, a legally binding international instrument to ban the use, production, transfer, and stockpiling of cluster munitions, as well as to create a framework for dealing with the consequence of cluster munitions’ use in the affected areas. Environmental damage and civil casualties are the highest concern for banning cluster bombs. Next meetings are planned for May/June in Lima, November/December in Vienna and early 2008 in Dublin. Last year Belgium has become the first country to ban cluster bombs, and this month [March 2007] the Belgian Senate passed legislation that criminalizes investment in companies that make cluster munitions. The Belgian Parliament plans to publish a list of companies that manufacture such munitions. Austria announced a moratorium on the use, production, or trade of cluster munitions. Canada promised to destroy its stockpile of cluster munitions. The U.S. Democrats recently introduced a bill in the U.S. Senate proposing to “restrict federal funds for the use, sale or transfer of cluster bombs.” Presently there are 34 countries producing cluster munitions and about 75 countries that stockpile them. [See also related items CCW Protocol V on Explosive Remnants of War Entered into Force in November 2006, NGOs Launch Campaign to Ban Cluster Bombs, and Draft Protocol on Cluster Bombs Cleanup Liability] (March 2007) Ref. 123

African Countries Call for International Ban on Cluster Bombs
The first meeting of African countries on cluster bombs adopted the “Livingstone Declaration,” endorsed by 38 out of 39 countries (South Africa, one of the continent’s two producer states was the exception.) The strong political declaration is formally committing the African countries to the negotiations for a global cluster munitions ban treaty to be held in Dublin, Ireland, May 19-30, 2008. There was widespread support for a broad definition of cluster munitions to avoid exceptions based on so-called ‘technical fixes,’ and on the need for comprehensive liability provisions for the affected communities. The Dublin meeting should conclude the Oslo process and agree on the final terms and language of a cluster bombs ban treaty, which would then be opened for signature before the end of 2008. [See also Negotiations Continue for an International Instrument to Ban Cluster Munitions in November 2007 and other items on this issue in previous environmental security reports.] (April 2008) Ref 124

NGOs launch campaign to ban cluster bombs
The Cluster Munition Coalition, involving NGOs from around the world, launched a campaign aiming to ban, under international law, the use of cluster bombs. The campaign also calls for help for victims and an overall cleanup of explosive remnants. Several governments - including the Netherlands, Canada, New Zealand and Mexico support the campaign. The campaign has two aims: embedding in international law the responsibilities of parties with regard to ERW, and binding the use of cluster munitions (CM) by universal humanitarian standards. Regarding CM, the campaign aims to restrict use and production, as well as trade in cluster munitions. (November 2003) Ref.125

Sunk Weapons Represent a Growing Health and Environmental Hazard
Tons of chemical weapons and ordnance abandoned at the end of World War II continue to litter the world’s oceans, representing serious hazards to the environment and human health. There is no compulsory international legislation requiring full disclosure of dumping sites and long-term monitoring of those areas (the London Convention of 1972 is not retroactive and cannot affect acts that had already been executed). However, one would expect that the countries responsible
would have moral obligations and common international customary law should demand action for cleanup and protection of humans and environment against the imminent hazards that those sites represent. [See also Chemical Munitions on San José Island, Panama in August 2004, and Ocean Dumping of Chemical Weapons a Continuous Threat in January 2004 environmental security reports.] (November 2005) Ref. 126

**OSCE Security Forum Urges Destruction of Thousands of Tons of Dangerous Ammunition and Weapons**

In a special meeting held on September 29 in Vienna, the OSCE's Forum for Security Co-operation (FSC) discussed the best strategies to secure and/or destroy the vast stocks of deteriorating weapons and munitions left over from the Cold War across Eastern and South-Eastern Europe, the Caucasus, and Central Asia. The life-threatening stocks represent a huge problem because of their quantity (very large—Ukraine alone identified 120,000 tons on its territory due for destruction), placement (in populated areas and next to important infrastructure), composition (some are nuclear), and costs (their destruction or secure storage exceeds the countries’ financial capabilities). Representing an imminent human and environmental hazard, and terrorism risk, it is critical to urgently deal with the situation. (September 2004) Ref. 127

**OECD and the Republic of Georgia Signed an Agreement to Eliminate or Recycle Leftover Munitions Dumps on Former Military Bases**

Recognizing that old weapons on former military bases have become a threat to safety, ecology, and security, the Georgian Government and the Organization for Security and Co-operation in Europe (OSCE) signed an agreement on 30 January 2003 establishing a project to eliminate or recycle these stockpiles of ammunition and bombs. The governments of Finland, Germany, the United Kingdom, the Netherlands, Sweden, and Turkey have assured financial support for the project. With similar closing of many post-Cold War bases around the world, it is reasonable to assume that other countries will also seek such international agreements. (January 2003) Ref.: 128

**OSCE-UN Launches Environmental Security Initiative in Southern Caucasus**

The Organization for Security and Cooperation in Europe (OSCE), the UN Environmental Programme (UNEP), and the UN Development Program (UNDP) launched the Environmental Security Initiative through a series of consultations in Armenia, Georgia, and Azerbaijan May 10th-18th. The purpose of the Initiative is to eliminate environmental problems that might cause political tensions. (May 2004) Ref.129

**International Crisis Group to Debate Considering Climate Change Variable in Conflicts**

The International Crisis Group, which tries to prevent conflicts by monitoring vulnerable regions based on indicators such as political instability, began in June to debate whether to include climate change as a new variable in its analysis. (June 2007) Ref. 130

**Australia Claims First Complete Cleanup of an Atomic Bomb Test Site**

Australia announced that it is the first country to successfully clean up a former (British) atomic bomb test site. The US$108 million rehabilitation buried 360,000 cubic meters (12.71 million cubic feet) of contaminated soil in 10-15 meter (33 ft-50 ft) deep trenches and treated radioactive
The Millennium Project

Emerging Environmental Security Issues

The success of this claim is disputed by Greenpeace and senior U.S. and Australian advisers who worked with the project. (March 2003) Ref.: 131

Controversy over the impacts of depleted uranium

Controversy over the impacts of depleted uranium
Study by Sandia on Depleted Uranium (DU)
NGOs Call for Action concerning the Use of DU in Iraq
Unexplained high levels of uranium found in Afghan urine samples
Kosovo Cleanup
UN confirms that contamination by depleted uranium Persists in Bosnia and Herzegovina
Environmental cleanup of depleted uranium continues in Montenegro with calls for assistance, reimbursement, and, in some NATO countries, a ban on such ammunition
Depleted Uranium Environmental Concerns Resurfacing
Updated Studies on Potential Health Implications of Depleted Uranium

Controversy over the impacts of depleted uranium

The health impact of armor-piercing bullets with depleted uranium (DU) is subject of continuing complaints and subsequent research in several former conflicts. Although one UNEP study in Kosovo found no significant impact of DU, Bosnia and Herzegovina has requested that UNEP conduct a study in their country. After examining 14 sites, a team of UNEP experts has identified three radioactive “hot spots” in Bosnia and advised the government of Bosnia to begin decontamination of the sites and to educate local people about the hazards. A full report will be published in March 2003. The World Health Organizations has warned that depleted uranium has significant chemical toxicity and UNEP is calling for "precautionary action" at locations where the public has access to depleted uranium sites. According to an article in the Seattle Post Intelligencer, Iraqi medical doctors say DU has caused cancer and birth defects. Others outside Iraq say DU has a role in the Gulf War Syndrome. Iraq offered a resolution banning weapons that used DU to the U.N. General Assembly's Disarmament and International Security Committee in November that got 35 votes in favor, 59 against, and 56 abstentions. (October 2002) Ref.:132

Study by Sandia on Depleted Uranium (DU)

Sandia National Laboratories has completed a study assessing health risks associated with accidental exposure to depleted uranium (DU), using as a case study the 1991 Gulf War. The two-year study, An Analysis of Uranium Dispersal and Health Effects Using a Gulf War Case Study, used mathematical modeling to estimate eventual health risks both on troops and civilians. The study’s findings are consistent with other U.S. studies on the same issue: there are no proofs of serious health risks implied from use of DU in combat. Closer exposure might enhance some risks, but at low level of probability. The report recommends monitoring of those exposed in close proximity or by handling DU, as well as considering conservative guidelines for uranium workers. [See also Claims of Radioactive Battlefields in Iraq need more scientific ground in August 2003, Depleted Uranium Controversy Continues in July 2003, and Health Research Updates on Depleted Uranium Inconclusive in June 2003 environmental security reports.] (July
NGOs call for action concerning the use of DU in Iraq

NGOs call upon the occupying powers in Iraq to take action concerning the DU left over from the Iraq war this year. The Nuclear Policy Research Institute (NPRI) is calling on the occupying forces to begin the cleaning up and establish long-term monitoring of "migration of DU into the environment" and allow independent research "to address the health problems" in Iraq. An NPRI forum on June 14, 2003 at the New York Academy of Medicine will more fully debated the “Health Effects of Depleted Uranium Munitions.”

The U.K.-based Campaign Against Depleted Uranium organized international demonstrations and events to protest against the use of DU weapons by several countries including the UK and the USA.

Several studies conducted by international organizations demonstrate that DU does cause contamination of the environment and might have serious health effects. (May 2003) Ref.: 134

Unexplained high levels of uranium found in Afghan urine samples

Even though both US and UK defense officials have said no depleted uranium shells were used in Afghanistan and an independent team also found no evidence of depleted uranium shells in Afghanistan, high uranium levels were found in urine samples of Afghan civilians and identified several hundred people suffering from illnesses and conditions similar to those of Gulf veterans. The team from the Uranium Medical Research Center (UMRC), based in Canada, which used an independent UK laboratory, cannot explain the uranium contamination. (May 2003) 135

Kosovo Cleanup

Two environmental "hot spots" identified by the UN in the wake of the Kosovo Conflict have been cleaned up and the condition of two others has been declared to be improved, bringing to an end a four-year remediation project run by the United Nations Environment Programme. Remaining remediation activities have been handed over to the Government of the Republic of Serbia. The precedent set by the UN’s involvement in post-conflict remediation of a battlespace suggests that the development of a post-conflict battlefield remediation treaty is possible. (November 2003) Ref.136

UN Confirms that Contamination by Depleted Uranium Persists in Bosnia and Herzegovina

For the first time, a UN report released in March 2003 confirms contamination of drinking water and air caused by the use of DU weapons in Bosnia and Herzegovina in 1994 and 1995. Even though the contamination is at a low level, monitoring is required. “The findings of this study stress again the importance of appropriate cleanup and civil protection measures in a post-conflict situation," said Pekka Haavisto, chairman of the UNEP DU projects. "We hope that this work will play a role in protecting human health and the environment in the unfortunate event of future conflicts." (March 2003) Ref.: 137, 138

Environmental cleanup of depleted uranium continues in Montenegro with calls for assistance, reimbursement, and, in some NATO countries, a ban on such ammunition

The controversy over depleted uranium continues in Europe. According to the New York Times, depleted uranium particles have been detected in the air and ground two years after the NATO attack in the Cape Arza area of Montenegro in 1999. Some research in the United States, Canada
and Britain has shown that uranium particles from depleted uranium-coated bullets can have potentially dangerous health effects, though there is no agreement on what a harmful dose would be. As a result, cleanup and storage is warranted by UNEP guidelines, leading the director of the Montenegro Toxicological Institute to call for NATO to "come and take back your radioactive waste and pay for decontamination."

If such calls proliferate, they could lead to new agreements requiring the military that used the bullets to remove them from the battlefield after the conflict or could lead to an outright ban of such ammunition. (September 2002) Ref. 139

Depleted Uranium Environmental Concerns Resurfacing
Concerns over the environmental and health effects of the use of depleted uranium munitions are resurfacing and increasing worldwide. The debate ranges from extensive articles in the news to testimonials by scientists and health tests of military veterans and active duty personnel who may have been exposed to depleted uranium. A British study by the University of Leicester—using MC-ICP mass spectrometry for detecting an individual’s exposure to depleted uranium—reveals that, depending on the rate of exposure, depleted uranium can be traced in urine 20 years after inhalation, even when the concentration was at the low end of the normal range. [See also Conclusions on Health and Environmental Impact of 1990-1991 Gulf War in July 2005 and other previous items on this theme, as well as Sensitive Uranium Detector Using DNA in February 2007 environmental security reports.] (November 2007) Ref.140

Updated Studies on Potential Health Implications of Depleted Uranium
Two recent studies by the Institute of Medicine address the possibility of assessing the potential health implications of exposure to depleted uranium: Gulf War and Health: Updated Literature Review of Depleted Uranium, and Epidemiologic Studies of Veterans Exposed to Depleted Uranium: Feasibility and Design Issues. Both studies conclude that health impacts of depleted uranium exposure in military and veteran populations are difficult to determine with the available data and procedures and an assessment plan would not be easy to design. However, the study on feasibility and design issues makes some recommendations for improving assessment of depleted uranium-related health outcomes, including “a prospective cohort study if future military operations involve exposure to depleted uranium” and better integration and linkages of DOD databases for identifying health issues of current active-duty military personnel and veterans with potential DU exposure. Both studies are pre-publications by the National Academies Press. (July-August 2008) Ref. 141

Sustainable Development and Conflict
The UN Commission on Sustainable Development’s Twelfth Session (CSD-12) was held in New York from 14 to 30 April. This meeting was the first substantive review of progress on targets set by world leaders at the 2002 World Summit on Sustainable Development in Johannesburg, which include many of the eight UN Millennium Development Goals (MDGs). CSD-12 discussions centered on halving by 2015 the number of people without access to safe drinking water and basic sanitation, and significantly improving the lives of at least 100 million slum dwellers by 2020. A number of the thematic issues reviewed included the intersection of conflict and natural disaster subjects with environmental and natural resource topics. (May 2004) Ref. 142
Governance is key to post-conflict environmental future says UNEP Report on Afghanistan

The United Nations Environment Program (UNEP) released the report, Post-Conflict Environment Assessment, on the environmental damage of two decades of warfare in Afghanistan. The report found that the most serious issue is the long-term environmental degradation caused, in part, by the complete collapse of local and national forms of governance. The report includes 163 recommendations to be implemented by the Government of Afghanistan with technical and financial assistance from the international community. If the linkage of governance and environmental management becomes better understood, then future international treaties on post-conflict environmental cleanup may include training and development (capacity building) for local governments’ environmental management. (January 2003) Ref.: 143, 144

Environment and Security Initiative Progress Report 2006

The Environment and Security Initiative—An international partnership for managing conflict and risk, progress report 2006, highlights advancement of ENVSEC sub-regional projects’ implementation in the Southern Caucasus, Central Asia and South Eastern and Eastern Europe, as well as the initiation of an environment and security risk assessment in the Belarus, Moldova and Ukraine sub-region. The issues identified for urgent attention by ENVSEC include: wastes, stocks of rocket fuel and obsolete pesticides from Soviet times, shared waters, and the continuing environmental consequences of the Chernobyl disaster. “Activities conducted under the ENVSEC Initiative show that environment can act as a bridge for crossboundary cooperation” says the report. The 2007–2009 work program includes over 70 projects based on region-specific priorities “related to need of further assessments, policy development, institution and capacity building as well as technical cooperation.” (April 2007) Ref. 145

Pressure mounts for increased funds and better techniques for demining

Minefields in Angola impede food aid delivery to tens of thousands of starving people and previously prevented farmers from harvesting crops. The World Food Program (WFP) calls for funds for demining activities. (May 2003) Ref.146, 147

Afghanistan destroyed a first stock of more than 500 landmines to demonstrate its commitment to the Global Mine Ban Treaty and said that it was ready to speed up the mine destruction process if the UN and donor countries provided assistance. Following attacks and threats to demining teams, in May the UN Mine Action Centre for Afghanistan had to suspend its demining work several times, until measures are in place to guarantee the security of its workers. (May 2003) Ref.: 148, 149

In June 2003 Tajikistan will start the first international mine clearance project supported by OSCE, the Canadian Government, and the Canton of Geneva in Switzerland. The project will consider the priorities set up by the Government’s recently published State De-mining Programme. According to the Tajik authorities, around 16,000 land mines laid during the ’92-’97 civil war by both sides, as well as by the peacekeeping forces, and later along the borders with Afghanistan and Uzbekistan, are dispersed over an area of 2,500 square kilometers. The de-mining action has been delayed due to lack of resources. (May 2003) Ref.: 150

Liability for World War II land mines in Egypt

Egyptian authorities estimate that there are 18 million landmines and unexploded bombs in the
el-Alamein desert, which threaten human life and retard the region’s development. Egypt does not have the resources to solve this problem and wants the landmines and ordnance removed. (November 2002) Ref.: 151

**Environmental Change and Security 12th Annual Report—Focus on Africa**
The 12th annual report of the Woodrow Wilson Center's Environmental Change and Security Program explores the link between environment, conflict, and cooperation in Africa, focusing on fragile states. It calls attention to other smaller—local—conflicts triggered by increasingly shrinking resources due to population growth, climate change, and accelerated environmental degradation. It warns that unless timely measures are taken, those small conflicts might escalate into wars and humanitarian disasters, such as in Sudan's Darfur region. However, "efforts to promote sustainability—and use natural resources as peacebuilding tools—could help turn deadly environments into safe, sustainable neighborhoods" say the authors. The report includes the contributions of eight African leaders and scholars. (June 2007) Ref. 152

The **Democratic Republic of the Congo** (DRC) and neighboring **Republic of Congo** (ROC), at the end of a two-day conference attended by representatives of several African countries from the region, sought support of the international community to eradicate antipersonnel landmines. Canada offered both financial and material support in an effort to encourage countries in the region to ratify the Ottawa Landmine Treaty. (May 2003) Ref.: 153

**Environmental Aspects of the Darfur Conflict**
**ICC Urged to Consider Environmental Crimes in Darfur Cases**
The International Criminal Court (ICC) has begun the prosecution process related to the Darfur conflict, but so far there is no mention of environmental crime, although environmental degradation is recognized as one of the underlying causes of the region’s devastating war. Refugees, human rights groups and legal experts have urged the ICC to consider man-made environmental crimes along with terror and mass killings in the prosecution of Sudanese officials and Arab Janjaweed. They argue that the ecological crisis—recognized as partly caused by climate change—was aggravated by the destruction of vegetation, land, and food and water sources that was ordered by government officials to force people to move. (August 2007) Ref.154

**Water Shortage for 2.2 Million in Refugee Camps Could Increase Darfur Conflict**
Water shortage might impede the peace process in Darfur. The number of refugees in camps reached 2.2 million in July 2007 and the risk of unrest is increasing as the water wells are running dry. As stipulated by the UN Security Council’s resolution adopted in July, a joint UN-African Union force of 26,000 multinational peacekeepers should be deployed in the area. However, their deployment and work are jeopardized by lack of resources, mainly water. (August 2007) Ref.155

**Environment to Get Crucial Role in Sudan's Future Peace and Prosperity Strategy**
UNEP is conducting detailed environmental assessments in order to identify environmental impacts, pressures, risks, and priorities for Sudan’s post-conflict reconstruction plans. Since December 2005, four field missions were conducted in each of the main geographic areas. These findings will be presented in the UNEP report Sudan – Post-Conflict Environmental Assessment
scheduled for release in October 2006 and then incorporated into national policies, plans, and laws for resource management in Sudan. UNEP is also currently preparing a program entitled Capacity Building for Environmental Governance in Sudan, which will cover the period 2007-2009. The UNEP study and recommendations are another example of the importance being accorded to the environmental dimension in post-conflict reconstruction. (July 2006) Ref. 156

UNEP Warns No Peace in Sudan without Environmental Management Plan
The UNEP report Sudan Post-Conflict Environmental Assessment underscores that the conflict-torn region is unlikely to achieve a lasting peace unless it switches to sound natural resources management. Desertification and deforestation, spread of deserts southwards, increased pressure by unsustainable agriculture, and environmental degradation exacerbated by oil exploitation all contribute to increasing scarcity of resources, the main cause of the Sudan conflict. The report emphasizes that if these problems are not quickly and appropriately addressed the conflict might spread. (June 2007) Ref.157

Disputes over Oil Might Reignite Congo-Uganda Conflict
Since the discovery of oil at Lake Albert in the border region of Uganda and Congo, tension between the two counties has escalated. Uganda responded to a series of violent incidents with several casualties by increasing troops along the border, and the media were talking of a “possible invasion of Congo”. “This is about oil. The stakes are enormous,” says Congo's petroleum minister, Lambert Mende. Both Uganda—a poor country, and Congo—seeking to rebuild after a ruinous war, have high hopes in a better, oil-fueled, future. Negotiations on the future joint management of reserves began, although the reserves are not yet assessed. (August 2007) Ref.158

UN to Demand Israel Pay Lebanon Compensations for War Damages
The Lebanese newspaper Al-Akhbar reported that UN Secretary-General Ban Ki-moon will submit a motion to the Security Council requesting Israel to pay Lebanon nearly $1 billion for environmental damages caused during the 2006 Second Lebanon War. The amount is based on a World Bank damage assessment including, inter alia, the cost of UN clean-up of the oil spill after Israel bombed a large refinery, but not related environmental damages. [See also Report on Lebanon After-war Environmental Assessment in February 2007, Environmental Legacy of Hezbollah-Israeli War in January 2007, and other related items in previous environmental security reports.] (September 2008) Ref. 159

Hezbollah-Israeli War Threatens an Already Precarious Environment
Arab countries are among the least environmentally sustainable in the world. The current wars are making this situation worse. The impact of the oil slick caused by Israeli bombing of the Jiyeh power station is an “environmental tragedy which is rapidly taking on a national but also a regional dimension,” warned UNEP Executive Director Achim Steiner. Long-term implications also include the loss to fishing for the Lebanese people, and decline in tourism. Presently the ecological damage spreads along 50 miles of the Lebanese coast; 10,000 tons of crude oil have been released into the Mediterranean, with another 15,000 tons expected to spill very soon. According to the Environmental Sustainability Index of Yale University, Iraq, Sudan, and Kuwait fall within the bottom 5% of the world for sustainability and half of the remaining Arab States scored in the lowest 25%. Without major changes, environmentally induced migrations
and more conflicts in the region seem inevitable. (July 2006) Ref. 160

Addressing Post-Conflict Environmental Security Issues
Further on last month’s item on the environmental consequences of the Hezbollah-Israeli war, UNEP announced the beginning of the cleanup operation of the massive oil spill caused by Israeli bombing of a fuel depot, which affected some 150 kilometers of Lebanese and Syrian coastline. It is estimated that the cleanup could take up to one year and might cost over $64 million. The massive damages to the ecosystem are already noticeable. [See also Hezbollah-Israeli War Threatens an Already Precarious Environment in July 2006 environmental security report.]

At the end of July 2006, the UN Compensation Commission announced the last disbursement to individuals who suffered because of Iraq's 1990 invasion of Kuwait. The total paid out to date is nearly $21 billion, while 49 other claims, including environmental ones are still pending. (August 2006) Ref.161

Environmental Legacy of Hezbollah-Israeli War
Lebanon—Post-Conflict Environmental Assessment, UNEP’s Post Conflict Branch report, is a comprehensive assessment of the legacy of last summer’s Hezbollah-Israeli war in Lebanon and its impact on the environment and human health. The report details serious environmental challenges confronting the Lebanese authorities and threatening the population’s health, and calls for urgent remediation actions. The highest risks are posed by leaked toxic and health hazardous substances, disposal of significant quantities of war-related debris, unexploded cluster bombs, and damaged water supply and sewage networks. (January 2007) Ref.162

Report on Lebanon After-war Environmental Assessment
Lebanon Rapid Environmental Assessment for Greening Recovery, Reconstruction & Reform—2006 report is a comprehensive review of the major environmental impacts caused by the July-August 2006 war, proposes some action plans to mitigate them, and explores opportunities for green reconstruction and recovery. It also looks at such environment-related legal aspects as improving national legislation and the options available to the Government of Lebanon to seek compensation for environmental damage. (February 2007) Ref. 163

Israeli Trench Raises Environmental Concerns
An Israeli concept for digging a 2.5-mile long trench along the Gaza Strip – Egypt border to reduce weapons smuggling has generated some environmental concerns. Specifically, flooding the trench with seawater could cause contamination of groundwater in the area. (June 2004) Ref. 164

UNEP Desk Study on the Environment in Iraq
The United Nations Environment Program’s (UNEP) Post-Conflict Unit has completed and released the Desk Study on the Environment in Iraq. The report provides a preliminary assessment of the main environmental threats in Iraq and recommendations for immediate and long-term cleanup. Critical long-term environmental vulnerabilities and risks are associated with water resource management, waste management, the oil industry, and ecosystem degradation. Two decades of war and misrule have left Iraq with extreme pollution and other environmental hazards that need urgent cleanup. The most urgent priorities are those needed to address humanitarian issues including restoration of water supply and sanitation systems, and cleanup of
accumulated municipal and medical wastes. A scientific assessment of areas where weapons
containing depleted uranium (DU) have been used is also a priority. Long-term projects indicated
include cleanup of hazardous wastes and emissions, better water and sanitation management, and
restoration of the country's ecosystem, especially the Mesopotamian marshlands that were
drained in 1991. The study also recommends that steps be taken to build strong national
institutions and capacities for long-term environmental management. (April 2003) Ref.: 165, 166

UN to Help Tackle Iraq Pollution
UNEP in collaboration with the Iraqi Ministry of the Environment will start a long-term, large-
scale environmental clean-up process. The project will begin with an assessment across the
country to determine the areas with highest threats, and prioritize areas for cleaning. For the pilot
project, five high priority sites are likely to be chosen out of more than 300 environmental 'hot
spots'. (September 2004) Ref. 167

Gulf Environmental Group Planned
Kuwait hosted a meeting on December 17-18 to establish a regional body to assess
environmental damage and coordinate cleanup projects in the Gulf, including in Iraq. The
meeting followed previous talks between officials from five countries: Kuwait, Iraq, Iran, Saudi
Arabia and Jordan. The chairman of Kuwait's authority for assessing compensation for damages
from Iraq's 1990 invasion and occupation has announced that among the goals of the meeting is
the establishment of a regional environmental rehabilitation advisory group, its objectives and
scope, and to establish a program for regional cooperation. [Note: at the time of this writing, the
results of the closed-door, three-day meeting were not yet available.] (December 2005) Ref. 168

Conclusions on Health and Environmental Impact of 1990-1991 Gulf War
Researchers from the Harvard School of Public Health (HSPH) revealed the findings of Phase I
of their study on the implications on the health of Kuwaiti civilians who remained in Kuwait
during Iraq's 1990 invasion and occupation. The investigations followed for 14 years the health
condition of 5,000 Kuwaitis over the age of 50 to assess likely mortality impacts of exposure to
smoke from the oil fires and also reviewed trends in morbidity and mortality data from Kuwait's
Ministry of Health. The conclusions show that an average individual risk on the order of
2/10,000 may be attributable to exposure to smoke from the oil fires. Screening assessing risks
connected to other contaminants -- such as volatile organic compounds, polycyclic aromatic
hydrocarbons and metals from the oil lakes and marine oil spills; and depleted uranium – also
indicated low risks to public health. [See also item 8.2 Study by Sandia on Depleted Uranium
further in this report]

The fifty-sixth session of the Governing Council of the United Nations Compensation
Commission (UNCC) concluded the assessment of compensations related to Iraqi 1990 invasion.
Some argue that the denial of billions of dollars in compensation to some countries for adverse
health and environmental effects of the 1990-1991 Gulf War sets a dangerous precedent to
discourage future targeting of natural resources and the environment in future wars.
Nevertheless, it is worthwhile to note that the fifth (and last) installment under category “F4”—
environmental claims—involved 19 claims filed by six Governments, out of which eight claims
filed by four Governments were approved by the Council for compensation, with a total award
value of over $252 million. (July 2005) Ref. 169
Iraq Marshlands to be Restored
UNEP announced an $11 million program, funded by the government of Japan, to restore the damaged marshlands of Iraq. The project will use environmentally sound technologies to restore drinking water and sanitation systems to the Marsh Arabs. (July 2004) Ref. 170

Iraq's Marshes Recovering
Iraq's Mesopotamian marshes, which almost vanished during Saddam Hussein's rule, are rapidly recovering to their former 1970s state, according to the findings of the Iraqi Marshlands Observation System. The system is the latest component of the UNEP marshlands project based on the use of a variety of environmentally sound technologies and technical training. However, the funding of the project might be in jeopardy for the moment, since Japan has postponed the donors’ conference due to the ongoing controversies over Iraq’s constitution. The marshes, reputed to be the biblical Garden of Eden, are a major source of fish and freshwater for local people, as well as an important habitat for wildlife. [See also UN to Help Tackle Iraq Pollution in September 2004 and Iraq Marshlands Restorations Could be Dangerous if not Preceded by Cleanup in October 2003 environmental security reports] (August 2005) Ref. 171

Iraqi environmental Harm in Kuwait Invasion Greater than Thought
Kuwait's Public Authority for Assessment of Compensation for Damages Resulting from the Iraqi Aggression presented the first results from U.N.-financed studies into environmental damage to the Governing Council of the UN Compensation Commission in October 2002. The study found greater Iraqi environmental damages than first estimated. Diplomats and U.N. sources said the commission was expected to approve a payment of almost $700 million to Kuwait for damage due to Iraqi mines and ordnance left behind as Iraq's troops fled. The Commission is scheduled to end its work at the end of 2004. (October 2002) Ref.:172, 173

Danger of Unexploded Ordnance in Basra Area
Abandoned munitions and unexploded ordnance (UXO) are injuring people every day in Iraq. There are about thirty abandoned munitions sites around Basra that British forces admit that they do not have sufficient troops to guard. Future international agreements may not only assign legal responsibility to the owners of the ammunition for its cleanup, but also extend the responsibility to occupying powers, independent of the reason for occupation. (May 2003) Ref.: 174, 175, 176

Crimes Against the Environment considered on the list of War Crimes against Saddam Hussein
The Kuwaiti parliament is currently considering specific war crimes actions against Saddam Hussein. Included in the war crimes list are “crimes against the environment”. These are separate from financial reparations actions previously taken. (February 2004) Ref.177

Environmental viability for life support is increasingly critical in the Palestinian Occupied Territories
The UNEP Desk Study on the Environment in the Occupied Palestinian Territories reports that water pollution, lose of natural vegetation, climate change, desertification, waste-dumping, and land degradation are escalating particularly in the Palestinian Occupied Territories due to military conflicts, protracted refugee situations, and rapid population growth. This study will be “one of the top items” for the UNEP Governing Council meeting of environmental ministers to
be held in Nairobi 3-7 February 2003. The potential human disaster in Somalia’s food supply, environment, and governance set the precedence for UN-authorized invasion. Although circumstances are different, the UNEP report increases attention to environmental deterioration as both a result and contributing cause of conflict. Such increased attention could eventually translate into international agreements for not only post-conflict environmental repair, but also for environmental security monitoring systems and criteria for environmental threats to life support sufficient to warrant international intervention. (January 2003) Ref.:178, 179

**Liability for World War II warships in the Pacific**
Some of the 2000 World War II warships loaded with oil, chemicals and ordnance in the South Pacific are beginning to leak. There are similar problems in the Mediterranean and on the California coast. Unlike commercial vessels, where salvagers can claim rights to sunken cargo, warships forever belong to their flag state. Assignment of liabilities for old conflicts may become a larger issue. Since many countries in the affected areas do not have the financial or scientific resources for cleanup operations, UN or other international resolution could one day require the responsible countries to provide financial and technical assistance to address these issues. (November 2002) Ref.: 180

**Effects of Poison Gas Used in WWII by Japan**
The Japanese government has decided to help citizens believed to be suffering from illnesses induced by contamination assumed to be related to chemicals produced by the military for use as weapons in WWII. According to a 1973 government survey made public in April 2003, Japan disposed of 3,875 tons of poison gas after WWII; the military will conduct an investigation on domestic post-war disposal of poison gas.

Japan has long been beleaguered and faced lawsuits over an estimated 700,000 chemical weapons it abandoned in China after the war. However, at the beginning of May a Tokyo court rejected a compensation claim from five Chinese over health damage they suffered, although it admitted that the chemical weapons were responsible for their health problems. (May 2003) Ref.:181, 182

**Japanese Chemical Weapons Cleaning in China Yet to be Completed**
June 2007 was the deadline agreed to by Chinese and Japanese authorities for cleaning up the Japanese chemical weapons littering China since the Japanese war against China. Yet, this month, a number of Chinese construction workers suffered health problems after being exposed to a ruptured mustard agent bomb believed to have been dropped by a Japanese warplane many years ago. The unexploded bomb was hit by the construction team while excavating for a residential building in Bayannaoer City in Inner Mongolia. The Japanese government is expected to receive a request to destroy the weapon, sources said. In May 2007, Japan’s Supreme Court ruled that Chinese victims of Japanese biological warfare and other atrocities that occurred before and during World War II are not eligible for compensation. (June 2007) Ref. 183

**Japanese Supreme Court Denies Chinese Wartime Claims**
Japan’s Supreme Court ruled that Chinese victims of Japanese biological warfare and other atrocities occurred before and during World War II are not eligible for compensation. Two cases involving about 200 Chinese required compensation and Japanese government apologies for biological weapons experiments, the firebombing of a Chinese city and other atrocities happened
in the 1930s and 1940s. The majority of the plaintiffs were relatives of the victims. “These are unjust rulings that ignore the human rights and personal suffering of the defendants. […] The Supreme Court has completely neglected its responsibility to uphold justice.” Historians estimate that up to 250,000 people might have died in Japan’s Unit 731 experiments that involved germ testing and vivisection. No unit personnel ever faced prosecution and Japan argues that the cases brought up happened before Japan’s ratification of relevant treaties. [See also Discussions over World War II Japanese Warfare Program in China not Settled Yet, China: Japan to Pay $2.7 Million for War Gas Leak, and Effects of Poison Gas Used in WWII by Japan.] (May 2007) Ref. 62

**Discussions over World War II Japanese Warfare Program in China not Settled Yet**
The chemical weapons left over by the Japanese invading army during World War II are still realistic threats to the Chinese people and environmental security, say Chinese officials urging Japan to take more measures to accelerate the process of destroying them. Chinese Foreign Ministry spokesman Liu Jianchao demands that the Japanese government follow the Convention on the Banning of Chemical Weapons and the memorandum on the destruction of chemical weapons reached between the two governments. Recently, Japan rejected China’s demands for apology and compensation for damages caused by the Japanese germ warfare program during World War II. Chinese Foreign Ministry said, “Germ warfare was one of the serious crimes of the Japanese militarist period during World War II… The Japanese government should properly deal with this problem by using an honest attitude, undertaking its full responsibilities and handling conscientiously the reasonable demands of the injured people.” The lawsuit has uncovered information about Japan’s biological warfare program kept secret by Japan’s government and the United States following World War II, says the Associated Press. For instance, the Unit 731 base near the Chinese city of Harbin may be responsible for as many as 250,000 deaths in the 1930s and ‘40s during the Japanese occupation of China. [See also China: Japan to Pay $2.7 Million for War Gas Leak in October 2003 and Effects of Poison Gas Used in WWII by Japan in May 2003 environmental scanning reports] (July 2005) Ref. 184

**Military Introduction of Tree Pathogen in Italy**
Researchers at the University of California, Berkeley, and in Italy, have shown the origin of a tree pathogen threatening Italian pine trees to be the US Army units that occupied the area 60 years ago. "This study suggests that when planning military operations abroad, there is a need, and a responsibility, to check for potential micro-organisms that could be introduced to foreign lands, and to take measures to prevent them from spreading." The research in Italy supports a common suspicion among plant pathologists in Europe that certain diseases in that region are linked to US Army bases. Although there does appear to be a correlation, there is no proof yet that other US bases are the cause of similar tree die-offs elsewhere in Europe. (April 2004) Ref. 185
NATIONAL AND REGIONAL INITIATIVES AFFECTING MILITARY ACTIVITIES

New national initiatives increasingly include the military for environmental protection, mitigation (after natural disasters), prevention, and preparedness, as well as assistance in compliance with international agreements.

Sustainable Development Strategies
The Intergovernmental Preparatory Meeting for the 15th session of the Commission on Sustainable Development (CSD-15) took place February 26-March 2, 2007 and discussed policy options and possible actions related to four thematic areas: energy, industrial development, air pollution/atmosphere, and climate change in the context of sustainable development, as well as the situation of small island developing states (SIDS), and inter-linkages and cross-cutting issues in the framework of the thematic areas. The draft Chair’s “negotiating document” that will be transmitted directly to CSD-15 has six sections, covering the four thematic areas, inter-linkages and crosscutting issues, and review and follow up. The 15th session of the CSD will be held April 30–May 11, 2007, in New York. Climate change also topped the agenda of the G-8 meeting held in Potsdam, Germany, March 16-17. The meeting, attended by environmental ministers of the G-8 countries plus China, India, Brazil, Mexico and South Africa, aimed to prepare for the G8 summit to be held in June, in Heiligendamm and the discussions for the December Climate Change Conference. Although consensus was reached on the need to protect the world's environment, consensus was not yet achieved on either post-Kyoto strategies nor on a global carbon emissions trading scheme like the one used in the EU. (March 2007) Ref.186

North American Environmental Security Action Plan
The 15th Regular Session of the Council of the Commission for Environmental Cooperation (CEC) was held June 25-26, in Ottawa, Canada. Key issues discussed included, *inter alia*: raising and harmonizing environmental standards across North America and effective enforcement of environmental law; reducing the risks of toxic substances to human health and the environment by improving chemicals management—implementation of SMOC (Sound Management of Chemicals) Program and of the North American Regional Action Plans, and improving border security by increasing the Parties’ cooperation on intelligence sharing and operational support to combat the importation, use, and production of such products (the list of hazardous chemicals is being revised); energy security and reducing greenhouse gas emissions (by encouraging green technologies in building and motor vehicles industries and the establishment of Green Suppliers Partnerships); continuing cooperation for marine and biodiversity protection; and climate change expected impacts for North America and mitigation and adaptation challenges.

As a preamble to the meeting, the CEC prepared *North America 2030: An Environmental Outlook*, a succinct overview of the region’s environmental stress factors and their trends. It includes a subchapter on environmental security, focusing mainly on the Northwest Passage, and food and energy security. A more detailed report on factors likely to impact North America’s environment to 2030 is expected to be published later in 2008. These papers are intended to assist the CEC in developing its 2010–2015 Strategic Plan. (June 2008) Ref.187

The Disputes over the Northern Territories Set to Continue
As the North is warming up, opening access to its rich resources, the territorial claims over the Arctic region are set to increase. Reportedly, Russia is prepared to challenge the international
community and claim sovereignty over large parts of the Arctic region that is now under the International Seabed Authority, on grounds of the region’s geological continuity and similarity with continental Russia. (June 2007) Ref.188

**U.S. Created Committee to Address Climate Change and Energy Security Issues**
The U.S. Congress created a 15-member Select Committee on Energy Independence and Global Warming to provide information and advice on the best policies to address America’s energy security and climate-change issues. "Energy independence and climate change are issues of national security and national urgency," said House Speaker Nancy Pelosi (D-Calif.) announcing the creation of the committee. [Note: A nationwide poll conducted for the Yale Center for Environmental Law and Policy revealed that 63% of Americans agree that the U.S. "is in as much danger from environmental hazards, such as air pollution and global warming, as it is from terrorists" and 81% of Americans are ready to take action personally in response to climate change.] (March 2007) Ref.189

**U.S. Policy Shift May Improve International Environmental Security**
Appointments of environmental scientists to the new U.S. administration, presidential memoranda, and speeches all signal that the new White House will give special attention to environmental matters from energy security to international cooperation for addressing climate change. Some bold actions considered by the new U.S. administration in its first week in office, include:

- implement the Energy Independence and Security Act that requires increasing car fuel efficiency standards starting with model year 2011 for reaching at least 35 miles per gallon by 2020 for cars and light trucks
- instruct the Environmental Protection Agency to allow California and other States willing to adopt stricter emissions standards for new motor vehicles (California’s law requires reducing vehicles’ emissions by 30% by 2016; so far, 13 other states and the District of Columbia want to follow California’s standards, representing about 40% of the U.S. car market)
- double capacity for alternative sources of energy like wind, solar, and biofuels over the next 3 years
- build a smart electricity super-grid to transport renewable energy from the West to the rest of the country
- allocate funds for weatherizing public and private buildings, and appoint a special envoy for climate change. There are also signals for tougher environmental standards, the adoption of a cap-and-trade system for CO₂ emissions, and America’s participation in the international efforts to negotiate a post-Kyoto Protocol on climate change
- appoint a climate change special envoy (Todd Stern) for international negotiation of actions and accords to address climate change causes and effects

(January 2009) Ref. 190

**NASA-Like Agency to Achieve a 10-Year Environmental Goal Proposed**
An international expert meeting on worst-case scenarios for global warming held at the Foundation for the Future near Seattle, Washington, proposed the creation of a NASA-like U.S. agency to achieve a 10-year environmental goal. A lobby, independent from the foundation, is being created, composed of environmental leaders, aerospace engineers, and business executives (working title is the American Climate Alliance) to get the US Congress to create the agency by
2010 that would reach the goal by 2020. (September 2008) Ref.191

**New Canadian Strategies for Monitoring the Northwest Passage**
Further on the opening of the Northwest Passage, the Canadian government is undertaking serious military and strategic operations for increased monitoring of the area for actions that might affect its sovereignty over the territory, as well as ecological impacts. In spite of strong disagreement between the Canadian Department of National Defence and Environment Canada on projections concerning the timing of the Passage’s accessibility for commercial and other navigation, new capabilities, funding and apparatus are being considered for increasing control. Those include: enforcing the Arctic Waters Pollution Prevention Act for avoiding ecological disasters; a highly mobile Rapid Reaction Battalions (based in B.C., northern Quebec, Newfoundland, and Ontario); armed icebreakers; and a deep-water port at the passage's eastern entrance. [See also *Northwest Passage to Become “Canadian Internal Waters”* in April 2006, and *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security reports.] (August 2006) Ref.192

**Russian Focus on Environmental Security**
Russia’s new President Dmitry Medvedev said: “Our country is in a threatened state. If we don't deal with this [environmental matters], then in 10, 20, 30 years we could be in a situation where part of the country’s territory is unfit for habitation…Ecology is a question of national security.” (June 2008) Ref.193

**Russian Military Exercise to Include Environmental Issues**
Russia is planning to conduct a military exercise in June 2004 that will include responding to an environmental disaster resulting from a terror attack. As Russia is scaling up its military exercises from the 1990s, environmental issues are being included in the exercise scenarios. (June 2004) Ref.194

**President Putin Cites Environmental Security as Key Criterion for Caspian Energy Projects**
During the summit of five Caspian nations in Iran, Russian President Vladimir Putin said “Environmental security must become a yardstick for measuring the safety of all projects”, and “projects that may inflict serious environmental damage to the region cannot be implemented without prior discussion by all five Caspian nations,” suggesting that each country should have a virtual veto on energy projects in the region. Note: in September 2006, Russia threatened to revoke environmental authorization for the Sakhalin II project. However, in April 2007, when Gazprom (state owned company) gained 50%+1 share in the Sakhalin Energy Investment Company, the President announced that the alleged environmental problems were adequately addressed. (October 2007) Ref.195

**EU and US to Cooperate on Environmental Research**
The US Environmental Protection Agency and the EU Commission's Directorate of Research have signed an agreement, *Implementing Arrangement on Environmental Research and Ecoinformatics*, setting up a bilateral research framework to more strategically address common environmental challenges. Among the collaborative research topics are: uses and impacts of nanotechnology; environmental information systems; development of environmental and
sustainability indicators; environmental modeling; decision support tools; environment and health; sustainable chemistry and materials; environmental technologies; and air quality management. (February 2007) Ref. 196

**EU Energy and Climate Change Policy**

**EU Renewable Energy Policy becomes Legally Binding**
The targets set by the EU 20/20/20 energy policy become legally binding for all member States by 2020. They are to cut greenhouse gas emissions by 20%, establish a 20% share for renewable energy, and improve energy efficiency by 20%. EU member states have to present their national action plans by June 2010, and report on progress every two years. [See also *EU Leaders Support the 20/20/20 Energy Plan* in March 2008 and other related items in previous environmental security reports.] (October 2008) Ref. 197

The European Council adopted its new Energy Policy to reduce CO2 emissions by 20% of 1990 levels by 2020—a target that could rise to 30% if the U.S., China, and other economic powers agreed to comparable reductions; and by 2020 to have 20% if its energy from renewable sources and 10% of its transport fuel be biofuels. The EU Conference of Presidents decided on March 15 to set up a temporary committee on climate change to provide clear information and suggest strategies to address the issue.

On March 28, the Commission unveiled its “green taxes” strategy that suggests splitting the EU-wide minimum excise duties into an energy tax and an environmental tax to reflect products’ impact on the environment and encourage environmentally friendly goods. [See also *EU Plans Tougher CO2 Emissions Cuts in February 2007*, and *New European Energy Policy Developments in March 2006* environmental security reports.]

Britain’s draft Climate Change Bill is pushing for a drastic emissions’ reduction policy and could make the country the first to limit greenhouse gases by law. The proposal—to become law next year if it passes public and parliamentary consultation—stipulates that an independent panel should set a "carbon budget" every five years, with the goal to cut CO2 emissions by 60% by 2050, from 1990 levels, and between 26% and 32% by 2020. Governments that miss the set target could be held liable. (March 2007) Ref. 198

**European Energy Security Strategies**
The recent natural gas crises caused by the Russia/Ukraine clash prompted Europe to address energy security more aggressively. The European Commission proposed a €3.5 billion (approx. $4.5 billion) program for new gas pipelines and electricity networks and offshore wind projects; earmarked €250 million (approx. $320 million) for the politically controversial Nabucco project (the outstanding balance to the estimated €8 billion (approx. $10.25 billion) to be covered by member states and private companies); and Germany is promoting the Nord Stream pipeline project. Europeans might also emulate the U.S. super-grid scheme to carry solar energy from the Sahara, geothermal energy from Iceland, hydropower from Scandinavia, and wind power from the North Sea. (January 2009) Ref. 199

**European Commission’s New Low-carbon 20/20/20 by 2020 Energy Plan**
The European Commission has proposed a package of measures to reach its “20/20/20 by 2020” targets — produce 20% of its energy from renewable sources and increase energy efficiency by...
20%, cut greenhouse gas emissions by 20% of 1990 levels (or 30% in case of a global accord), and considerably reduce reliance on energy imports. The detailed roadmap includes specific renewable energy and CO2 emission targets for each EU member state; new rules for carbon sequestration; and an updated Emissions Trading System for fair greenhouse gas emissions cuts for different emitters, with the aim of gradually including all industries in the emissions auction scheme. The Commission's proposals have to be endorsed by the European Council and Parliament, with the final package expected to come into force by the end of 2009. The European Commission hopes that the plan will trigger strong momentum towards a global agreement. Meantime, the European Commission is also considering introducing a climate tax on imports from states failing to tackle greenhouse gas emissions, and toughening EU's emission trading system. [See also EU Energy and Climate Change Policy in March 2007 environmental security report.] (January 2008) Ref.200

**EU Leaders Support the 20/20/20 Energy Plan**
At the recent EU summit (March 13-14), member states’ leaders indicated support for the EU’s 20/20/20 energy plan. The package should receive full political backing by all governments by the end of 2008 in order to be discussed at the EU Parliament in the first week of 2009. In spite of the tight deadline, EU officials are confident that the plan will pass in time to give the EU a better negotiating position at the December 2009 UN climate change summit. At the same time, despite some countries’ disagreements and complaints, the European Commission reaffirmed that it is not willing to change the timetables and national targets. However: 1) some concessions were agreed for energy intensive industries such as steel and cement factories, which could get free pollution permits—instead of having to buy them by auction, and 2) foreign companies might also be made to take part in the emissions trading system (ETS). (March 2008) Ref.201

**European Temporary Committee on Climate Change to Begin Operations in May 2007**
The European Parliament approved the establishment of a new temporary committee on climate change. The 60-member committee will start work on May 10, 2007. It will design and suggest strategies and policy options for the 27 EU states to address energy and climate change issues. It is also expected that the committee will strengthen EU’s international role in intensifying action to tackle climate change, pushing it to the top of the international agenda and furthering post-Kyoto Protocol's negotiations. [See also EU Energy and Climate Change Policy.] (April 2007) Ref.202

**To Join the EU, Balkan Countries Should Increase Environmental Efforts**
Balkan countries wanting to join the EU—Croatia, Bosnia, Serbia, FYR Macedonia, Montenegro and Albania—must pay as much attention to environmental protection as they do to economic development if they want to join the bloc, says the UNDP report Balkan Vital Graphics: environment without borders. Spending on environmental protection should increase from the present share of less then 0.1% to 0.7% of the GDP, to at least 1.5-2%. The six Balkan countries are working on a joint environmental strategy, but an agreement is yet to be reached. (October 2007) Ref.203

**New Construction on Mediterranean Coastlines to be Banned**
The recent meeting of the Barcelona Convention [for the Protection of the Marine Environment and the Coastal Region of the Mediterranean] added a new protocol on Integrated Coastal Zone
Management to strengthen regional co-operation for harmonious and sustainable use of the Mediterranean coastal zone, including banning any construction within 100 meters (about 328 feet) to the water all along the Mediterranean shore. The participants also issued the Almería Declaration that requires all member states to catalog threatened marine species by 2011 and establish a network of protected coastal areas by 2012. To ensure that the convention’s provisions are enforced, the first compliance system was established, and the parties agreed to create an enforcement committee. [See also OSCE-NATO Workshop on Environmental Security in the Mediterranean and European Parliament Passed the Marine Strategy Directive in December 2007 and other related items in previous environmental security reports.] (January 2008) Ref.204

**UK Defense Ministry released its first Sustainable Development Report**

Ministry of Defense of the UK released its first stand-alone report that aims to provide an overview of the Department’s work on Sustainable Development issues. MoD’s program for the coming years includes improved data collection systems and the continued integration of sustainable development considerations into procurement. MoD intends to produce an interim report for 2004/2005 and a full report each financial year thereafter. (August 2005) Ref.205

**UK to Establish an Independent Climate Committee**

The parliament of the UK plans to establish an independent climate committee that would report to the parliament on an annual basis, said MP Elliot Morley, member of the UK Parliament and the Government’s Special Representative on the Gleneagles Dialogue on Climate Change, Clean Energy and Sustainability, addressing NATO’s Advanced research Workshop on “Energy and Environmental Challenges to Security.”

During his first speech as the UK’s Prime Minister, Gordon Brown stressed the importance of addressing climate change in a global framework and said, “As we move to a post 2012 global climate change agreement, we need a strengthened UN role for environmental protection.” Scientists and policymakers attending the UK Environment Agency annual conference called for increased efforts to address climate change effects. The Agency’s chief executive, Lady Young, said that climate change needs to be addressed like “World War Three”, noting that current adaptation measures are “too little, too slowly.” UK Environment Secretary Hilary Benn warned that climate change “is not just an environmental challenge. It’s also a security challenge, a migration challenge, a political challenge and an economic challenge as well.” (November 2007) Ref.206

**France Could Add Teeth to the Kyoto Protocol**

France’s President Nicolas Sarkozy is proposing a tax revision that would favor environmentally friendly practices and lower labor taxes, while increasing taxes on highly polluting vehicles and imports from countries that do not respect the Kyoto Protocol. Sarkozy’s proposals are expected to be passed by parliament early next year. France also intends to expand its strategy to the EU, urging Brussels to consider EU tariffs for imports from non-Kyoto protocol countries. (October 2007) Ref.207

**EU, Latin American and Caribbean Countries Environment Cooperation**

The first meeting of the EU, Latin American, and Caribbean countries’ environment ministers took place in Brussels, March 4, 2008, in a pre-meeting to the high level summit to be held in
Lima, in May. More than two dozen environment ministers attended the meeting aiming to identify common priorities in order to increase environmental efforts and better integrate them in the EU–LAC countries’ areas of cooperation. The focus was on collaboration strategies between the two regions for addressing climate change, renewable energy, biodiversity loss, and deforestation. The EU has already pledged considerable funds to help the region in domains such as natural resource management, renewable energy and energy efficiency, forest management, climate change mitigation, greenhouse gas reduction, carbon sequestration, and governance.

(March 2008) Ref.208

Argentina Redeploys Military to Defend Water and Oil
The Argentine government is changing its military strategy based on the forecast that conflicts over water and oil are the most likely long-term national security threats. The most vulnerable area is the Guarani aquifer that neighbors Uruguay, Brazil, and Paraguay. The Army "Plan 2025" was launched last year and includes parceling the country into regions based on their resource potential—mainly oil and fresh water. "Each division will be based in the geographical areas where the natural resources that we hypothetically must defend are located," Argentine Army Commander-in-Chief Roberto Bendini said in revealing the plan. (March 2007) Ref. 209

Ecuador Gets an Environmentalist Foreign Minister
President Rafael Correa of Ecuador (to take office in January) has named a US-trained environmentalist, Maria Espinosa, as his foreign minister. The new cabinet member is head of the World Conservation Union in South America and an expert on nature reserves. The nomination comes at a time of growing tensions with neighboring Colombia over spraying of drug crops near the border, which damages Ecuadorian legal crops and the health of people living in the area. (December 2006) Ref. 210

Uganda to Create an Environmental Police Unit
The Uganda National Environment Management Authority announced that it will form a police unit to “address environmental crimes, investigations and prosecution.” The unit is expected to be operational in the next financial year. The Nature and Extent of Environmental Crime in Uganda report lists as leading environmental degradation causes: illegal waste disposal, pollution, and dumping and encroachment on protected areas. (October 2008) Ref.211

East African Environmental Projects to Fight Crime and Link Journalists
The Environmental Crime Project launched jointly by the Institute for Security Studies and Eastern Africa Police Chiefs Cooperation Organization has the mandate to develop mechanisms to improve environmental law enforcement and policy making in the East African region. The project will operate in Uganda, Kenya, Tanzania, Burundi, Rwanda, Seychelles, Ethiopia and Sudan, increasing protection against all forms of environmental crimes.

The new Network of Climate Journalists in the Greater Horn of Africa (NECJOGHA, www.necjogha.org) represents an interactive resource for environment-related information and communication in the region. The network is the result of collaboration among many international and national environment organizations, universities, and climate centers. (July-August 2008) Ref.212
Iran and Iraq Sign Environment Protection Agreement
Iranian and Iraqi chief environment officials signed an agreement for increasing the two countries’ cooperation in areas related to the environment. The eight-article document covers issues of natural resources, industrial and oil-exploitation pollution control, wildlife protection, and promoting ecotourism, as well as addressing environmental damage caused by wars. (January 2008) Ref.213

Israel to Participate in UNEP and UN HABITAT
The Western European and Others Group regional bloc within the UN elected Israel to represent the regional group in consultations with the UN Environmental Programme and the UN Human Settlements Programme (UN–HABITAT). This could create unique opportunities to address environmental security issues in the Palestinian territories, which are among the most severe in the world. (January 2008) Ref.214

Waste Disposal a Matter of Discord or Cooperation between Palestine and Israel
Waste disposal might additionally fuel the increasingly tense relations between Israel and the Palestinian Authority as waste is transferred from Israel to areas of the West Bank. The main problem is that large quantities of building waste are deposited in pirate sites near Palestinian villages. Some contain toxic substances polluting the environment, leaking into the water system, and endangering the public health of both Palestinian and Israeli people. Scientists and environmentalists call on the two parties to leave aside diplomatic disagreements and develop collaborative relations on environmental issues generally and on solving the waste problem specifically. (March 2008) Ref.215

Gulf Cooperation Council elevates priority of environmental protection
The Secretary-General of the Gulf Cooperation Council (GCC) remarked in a recent environmental awards ceremony that the GCC leaders have an interest in joint environmental projects and efforts to increase environmental awareness. Sheik Jaber of Kuwait stated that commitment to environment protection was necessary from all countries in the region as an integral issue that could not be separated by borders. These statements define regional environmental policy, which in effect commit GCC member states to increase environmental protection efforts. (August-September 2003) Ref.216

Pan-African Parliament Upgrades Environmental Policy
Environmental issues were given increased emphasis during the Pan-African Parliament (PAP) Seventh Ordinary Session held in May 2007. Deputies and experts discussed the liability of Western countries relating to the continent’s environmental degradation, and called for financial compensation and technological assistance to correct the situation. The recommendations of the committee on the environment included: request the PAP strengthen legislation for protection of the environment and fighting against pollution; establish synergy among African scientific research institutions related to protecting the environment; create a network of environmental centers; create an African Environment Protection Observatory (AEPO); support regional initiatives; improve global cooperation and implementation of the Convention on Desertification; and strengthen international cooperation in scientific research and technology transfer. There were important debates about an African integration—a United States of Africa model—and the final document recommends that the African Union further consider such a union’s feasibility. It
also recommends giving PAP, which started in 2004, the powers of a legislative organ. (May 2007) Ref. 217

**Nigerian Government Resolves to Push Effective Environmental Enforcement**

On the occasion of a visit from a UK Environment Agency team, the director-general of the Nigerian National Environmental Standards and Regulations Enforcement Agency (NESREA) stated the government’s increased commitment to ensure a cleaner and healthier environment for Nigerians through effective enforcement of environmental laws. (February 2008) Ref. 218

**Indian Military Upgrades its Counter-WMD Strategies**

The Indian Union Home Ministry and the Health Ministry are to prepare “standard operational procedures to deal with terror attacks using biological weapons.” Indian military chiefs and senior military scientists held a week-long conference to examine their troops’ preparedness in the eventuality of conflicts involving nuclear, biological, or chemical (NBC) weapons. The meeting discussed progress in protective technologies (such as anti-radiation clothing and tanks, and armored carriers resistant to WMD attacks). Last month, an Indian paramilitary unit tasked with protecting key installations announced that it would organize two specially trained anti-WMD battalions by the end of 2006. (April 2006) Ref. 219

**New Norwegian Emergency Force Set Up**

Norway has set up a special emergency force of 1,000 soldiers from the Army prepared to handle national emergency situations mainly related to terrorism, and natural and environmental catastrophes. This is the first time since the Cold War that Norway has established such a unit. (January 2006) Ref. 220

**The Environmental Dimension of Asian Security**

*The Environmental Dimension of Asian Security. Conflict and Cooperation over Energy, Resources, and Pollution* “published by the U.S. Institute of Peace, analyzes the nexus between environmental and natural resources (ENR) problems and security in Northeast Asia” says a book review. The book argues that in the region “there is very little regional cooperation, despite the need to manage disputes over energy, natural resources, and pervasive pollution.” (November 2007) Ref. 221

**Asia-Pacific Should Intensify Green Growth Efforts**

The State of the Environment in Asia and the Pacific 2005 report, published by the United Nations Economic and Social Commission for Asia and the Pacific, notes that the region needs to shift towards ecologically efficient, ‘green growth’ patterns, if it wants to continue its growth. Acknowledging some efforts on new regulations, it documents that many areas are still in great need of improvement. High population density, low freshwater availability and biologically productive area per capita of all global regions, and the growth of highly energy-intensive and polluting industries, along with increasing waste, are some of the most important concerns. The report offers a comprehensive picture of the region’s trends both as problems, and as shortfalls that still have to be regulated. (December 2006) Ref. 222

**Korean Environmental Groups Request Release of U.S. Base Data**

Green Korea and the Chuncheon Civic Group filed a lawsuit against the South Korean Ministry
of Environment demanding full release of environmental data and the state of former U.S. military sites that are being returned to South Korea. The request is motivated by preliminary research findings by the Ministry of Environment leaked to Seoul’s Hankyoreh newspaper earlier this year. Both U.S. Forces Korea and the South Korean government refuse to comment, invoking the SOFA between the two countries. Some data, debated in the national assembly, reveals troubling high pollution of the sites by lead, BTEX (benzene, toluene, ethyl benzene and xylene aromatic solvents), petroleum hydrocarbons, and several chemicals. South Korean officials refuse to take over the sites and rejected a compromise offer, USFK commander Gen. B.B. Bell told Stars and Stripes. Ref.223

**UNEP and South Korea to Help North Korea’s Environmental Management**

UNEP and the Republic of Korea agreed to set up a Trust Fund for projects addressing key environmental issues in the Democratic People’s Republic of Korea. This first collaboration of the two countries on environmental matters aims to address urgent problems in the DPRK related to forest, water quality, air pollution, land degradation and biodiversity, as well as support eco-housing initiatives, conservation management, environmental education, clean development mechanisms and renewable energy technology, and environmental monitoring. (November 2007) Ref.224

**Asian New Strategy to Improve Health and Environment**

At the First Ministerial Regional Forum on Environment and Health, held in Bangkok, August 8-9, 2007, top environmental and health officials from Southeast and East Asian countries adopted the Bangkok Declaration on Environment and Health. The Declaration aims to set up strategies to reduce the estimated 6.6 million annual deaths—representing approximately 25% of all deaths in the region in a year—attributable to various environmental health risks such as air pollution, solid and hazardous wastes, and numerous man-made disasters. The Declaration provides a mechanism for improving collaboration in policy and regulatory frameworks at the national and regional level, and promotes the implementation of integrated environmental health strategies and regulations. It covers areas from air and water quality, to hazardous substances and climate change—including contingency planning, preparedness and response to environmental health emergencies. A second Ministerial Regional Forum is planned for 2010. (August 2007) Ref.225

**Japan Sets up e-Waste Collection Locations to Recycle Rare Metals**

Odate city in northern Akita Prefecture, Japan has set up collection boxes for people to get rid of old cell phones, hair driers, and other electronic devices to recover rare metals. The demand for rare metals is increasing with the growth of high tech products. Hence, availability and future cost of indispensable rare metals is of increasing concern. This collection of e-waste and recycling is spreading throughout Japan with the help of subsidies from the Environment Ministry. (December 2008) Ref. 226

**Climate Change Issues May Have Determined Australian Election**

Environmental policy seems to have been one of the determining factors in Australia’s election and the success of the Labor Party, which has environmental issues such as climate change and signing the Kyoto Protocol as top priorities. It is therefore expected that Australia will adopt more environmentally protective policies. Given its status as a major regional power, Australia’s
attribution could affect international and regional environmental deliberations. (November 2007) Ref.227

Environment and Security Program in the East-Caspian Region
The regional meeting of the Environment and Security (ENSVEC) Program in the East-Caspian region was held in Ashgabat, Turkmenistan, and was attended by leading specialists from Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Russia, Italy, Iran, and Afghanistan, as well as representatives of OSCE, NATO, UNEP and UNDP. In the framework of implementation of the ENSVEC program for environmental protection and cooperation in the region, the focus was on the East-Caspian Sea’s coastal area development, pollution reduction, and ecological preservation and restoration. The start of the ENSVEC program in the Atyrau and Mangistau oblasts of Kazakhstan and Turkmenistan was also announced. The Central Asia ENSVEC program priority regions include: the Fergana Valley, the Caspian Sea's Eastern Coast, the Semipalatinsk Nuclear Ground, the Amu-Darya river basin, and the Aral Sea. (September 2007) Ref.228

Environmental security among top three priorities in Australia-China talks
Among other things, China and Australia agreed during private talks during the September APEC meeting to cooperate on clean coal and nuclear energy to reduce greenhouse gas emissions. They plan to continue annual strategic security meetings including environmental security matters. (September 2007) Ref.229

China May Restructure Environmental Effort
Chinese President Hu Jintao, opening the ruling Communist Party’s five-yearly Congress, called the environment key to “the survival and development of the Chinese nation” and said that China should improve its economic/environment balance. There are speculations that China’s State Environmental Protection Administration may be given more status and power as early as next year. “It is still under discussion how the new organization should be,” said Xia Guang, director of the Policy Research Center for Environment and Economy, a think tank within SEPA, during a recent talk at Brown University. [See also China’s Climate Change and S&T Action Plan in June 2007, China’s President Hu Ordered Environmental Regulations for Military Activities in April 2006, and other related items in previous environmental security reports.] (October 2007) Ref.230

China’s Five-Year Plan Increases Attention to Environmental Protection
The third of six points of the Chinese 11th Five-Year Plan for Economic and Social Development (2006-2010) states: Third, we will promote development by relying on resource conservation and environmental protection and focus on the fundamental change of the economic growth mode, transforming economic growth from being driven by large amount of resources consumption to being driven by the improvement of resources utilization efficiency. A white paper issued by the Information Office of China's State Council entitled Environmental Protection in China (1996-2005) is a comprehensive overview of China’s enhanced attention to environmental protection, outlining efforts and achievements at the internal level, as well as its international cooperation in environmental matters, and future trends and policies. The paper stresses the need for more stringent regulations, policies, and enforcement. China’s monitoring and management capabilities are to be improved by an advanced environmental early-warning
system, and a sound environmental law enforcement and supervision system. The paper also includes addressing nuclear and biological safety issues. This is China’s second white paper on environmental protection since 1996. (June 2006) Ref. 231

**China’s Energy Conditions and Policies—White Paper**

China’s Information Office of the State Council issued the country’s first-ever, white paper on its energy conditions and policies. The paper indicates a shift towards a more environment-centered energy policy, prioritizing sustainable development based on S&T, and strengthened international cooperation in the field of energy. It emphasizes, “China did not, does not and will not pose any threat to the world’s energy security.” [See also *China May Restructure Environmental Effort* in October 2007, and other related items in previous environmental security reports.] (December 2007) Ref.232

**China’s New Ministry of Environmental Protection**

China announced the creation of five new “super ministries”: Ministry of Industry and Information, Ministry of Human Resources and Social Security, Ministry of Environmental Protection, Ministry of Housing and Urban-Rural Construction, and Ministry of Transport, and a ministerial-level national energy body to oversee energy policy across all ministries. Establishing the new environment ministry is intended to help tackle China’s growing pollution problems. Environmental monitoring and law enforcement will be high priorities, said future minister of environmental protection, Zhou Shengxian, at the 2008 National Environmental Law Enforcement Conference. (March 2008) Ref.233

**China Calls for Enhanced Cooperation on Environmental Protection in Northeast Asia**

At the Opening of the 12th Senior Officials Meeting of the North-East Asia Sub-regional Program for Environmental Cooperation, Cui Tiankai, Assistant Foreign Minister of China, said environmental protection is an integral part of international and regional cooperation as nations face a number of traditional and non-traditional security threats. He urged six member countries (China, Japan, North Korea, Mongolia, Russia and South Korea) to enhance cooperation on environment and sustainable development. [See also *Asia-Pacific Should Intensify Green Growth Efforts*, *New Environmental Think Tank for Asia*, and *Meeting of Asia-Pacific Partnership on Clean Development and Climate.*] (March 2007) Ref.234

**China’s Climate Change and S&T Action Plan**

China launched its first national climate change program in June 2007. Although it does not include mandatory caps on emissions, it shows a strong commitment to reducing greenhouse gas emissions. The program highlights some major targets and actions to achieve them by 2010: reducing energy consumption by about 20% per GDP unit; increasing the share of renewable energy to 10% of the primary energy supply; keeping emissions of nitrous oxide from industrial processes at 2005 levels; increasing reforestation by 20%, and increasing international cooperation. The program notes that “China’s energy efficiency is about 10% lower than that of the developed countries, and its per unit energy consumption of energy-intensive products is about 40% higher than the advanced international level. Science and technology are the ultimate resort for humankind to tackle climate change.” In view of this, the Chinese Ministry of Science and Technology has released an action plan for the science and technology (S&T) aspects of China's new climate change initiative.
Note: The Chinese State Environmental Protection Administration report released in June reveals a continuous deterioration of air and water quality in Chinese cities despite national efforts to reduce pollution levels. Concomitantly, preliminary estimates by the Netherlands Environmental Assessment Agency reveal that in 2006 China surpassed the U.S., becoming the world’s largest CO₂ emitter. (June 2007) Ref. 235

China to Invest $175 Billion in Environmental Protection over Five Years
China plans to invest $175 billion (about 1.5% of GDP) in environmental protection in the next five years, to curb severe water and air pollution, which is causing riots and health problems. The money is to be spent on such measures as control of water pollution, improving air quality in cities, and halting soil erosion. China has 20 of the world's 30 most smog-affected cities, and 2.5% of its grain is estimated to be contaminated by heavy metals. [See also China Creates 11 Independent Environmental “Watchdog” Centers in the July 2006, China’s President Hu Ordered Environmental Regulations for Military Activities in April 2006, Chinese Research Priorities for the Next Fifteen Years in March 2006, and other related items in previous environmental security reports.] (September 2006) Ref. 236

China Creates 11 Independent Environmental “Watchdog” Centers
China is establishing eleven watchdog centers to monitor and investigate environmental issues free from local government interference. The centers will operate under direct control of the State Environmental Protection Administration (SEPA) and will include five centers for environmental supervision, and six centers to monitor nuclear and radiation security. The main role of this nationwide network is to enforce environmental laws and regulations independent of local governments. The 11 centers will be included in SEPA's 24-hour emergency response system. [See also China’s President Hu Ordered Environmental Regulations for Military Activities in April 2006, and Chinese Research Priorities for the Next Fifteen Years in March 2006, and other related environmental security reports] (July 2006) Ref. 237

China’s President Hu Ordered Environmental Regulations for Military Activities
The People’s Liberation Army of China has been directed by President Hu Jintao to submit its construction and training plans, as well as materiel transfer, weapon purchases, repair, and disposal to local authorities for approval regarding environmental impacts. The President also issued new regulations that specify assessment procedures and penalties for infractions. Construction of military bases, ports, logistics centers and exercise fields is to be approved only after the project passes environmental evaluation, including approval by local environment authorities. (April 2006) Ref. 238

Chinese Research Priorities for the Next Fifteen Years
The Chinese Academy of Sciences (CAS) announced its research priority for the next fifteen years. Areas of research are: drug and biofuel development; nanotechnology and new materials; genomics and proteomics; renewable energy and technologies for capturing carbon dioxide emissions; sustainable agriculture; and the next generation of information technology (IT). The academy investment is expected to grow by 70% in the next five years and then by about 12% annually until 2020 making it a major player in the future of science and technology. Note: East Asian Strategic Review 2006, a recent report by the Japanese National Institute for Defense Studies, warns that increasing Chinese research on the development of technologies for
mounting “China’s military muscle can be seen as major destabilizing factors in East Asia.”
(March 2006) Ref. 239

**Asia and Pacific Countries Adopt Declarations on the Environment**

At the Fifth Ministerial Conference On Environment And Development in Asia and the Pacific that took place in Seoul, Republic of Korea, 24-29 March 2005, ministers and senior officials from 52 Asian and Pacific countries pledged green-friendly approaches to development in the region. The delegates adopted the Ministerial Declaration on Environment and Development in Asia and the Pacific (2005), the Regional Implementation Plan for Sustainable Development in Asia and the Pacific (2006-2010) and the Seoul Initiative on Environmentally Sustainable Economic Growth. These instruments set clear implementation actions to promote environmentally friendly economic policies, including promoting partnerships and economic tools to improve ecological efficiency, reviewing national laws and identifying, assessing, monitoring, and capacity building to manage disaster risks.

The leaders' group from the Pacific Islands Forum held its first meeting on the Pacific Plan, a Forum initiative. One of the four areas of concern is sustainable development and environmental security. The Pacific Islands Forum is the association of the 16 independent island states of the Pacific. Its objective is "to enhance the economic and social well-being of the people of the South Pacific". The Plan lays out how the region can improve cooperation in the four areas; it will be further developed during the coming months. (March 2005) Ref. 240

**UK Cooperation with India and Others on the Environment and Sustainable Development**

As the result of a meeting between their ministers of environment, the UK and India have decided to enhance cooperation in dealing with issues related to sustainable development. These issues include emission of greenhouse gases, joint research on climate change, wildlife conservation, and reforestation. The UK Minister, Elliot Morley, also stated that this year, within the G8, the UK would focus on multifaceted and complex areas of climate change and Africa, and that these talks with India are the first in a series of dialogues that the UK will initiate with developing countries with rapidly growing economies, the next being China. (February 2005) Ref. 241

**India Drafting New National Environment Policy**

Having received inputs from the constituent states and others, the Ministry of Environment and Forests in India is about to begin preparing the final draft of the new National Environment Policy. This comprehensive new document will replace a variety of single-issue statements and will incorporate the concepts of sustainable development. The policy addresses all levels of concern, from local to global, and is based on seven objectives and 15 guiding principles. (January 2005) Ref. 242

**Environmental Courts Established in the Philippines**

The Philippine Supreme Court has designated 117 trial courts as ‘environmental courts’ to hear cases involving violations of laws protecting the country’s natural resources and to speed up their resolution. (January 2008) Ref.243

**US-Uruguay Treaty on S&T Cooperation**

On April 29th the US and Uruguay signed a treaty to increase government, academic, business,
and NGO scientific cooperation between the two countries. The agreement gives special attention to the study of biodiversity to improve agriculture, medicine, and understanding of the impact of climate change on the environment. (May 2008) Ref.244

TECHNOLOGICAL BREAKTHROUGHS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

New technologies are offering improved detection, cleanup, monitoring, and surveillance possibilities. WHO is developing a global epidemic simulator based on the model of climate monitoring systems. Small robotic helicopters operated by radio control could be used for reconnaissance and surveillance. High-sensitivity portable chemical and biological devices offer high accuracy detection, monitoring, and cleanup possibilities with rapid response time. However, future autonomous robotic weapon systems (without human decision-making control) are increasing vulnerability and concern over possible catastrophes.

Advances in biosciences not met by adequate security systems increase the risks of their potential misuse, the threat of biological weapons, and the likelihood of SIMAD, for Single Individuals Massively Destructive. The Biological Weapons Convention might need to be revised in view of the new synthetic biology developments, and verification and monitoring regimes would need to be developed to ensure compliance.

In order to prevent the misuse of science, it is important to strengthen the scientific expertise of security organizations and to create an independent science and technology advisory committee for intelligence agencies, as well as to promote within the international scientific community a common culture of awareness and responsibility.

Computer Technology and Robotics
New Detection and Cleanup Techniques
Counter Bioterrorism or Pandemic Technologies
Promising Environmental-friendly Technologies
Space Technology
Technologies that Could Trigger New Forms of Arms Race

Computer Technology and Robotics
Predictive Conflict Modeling to be used for Determining Conflict High Risk Areas and Improving Policy for Enhancing Stability in those Countries
UNEP and Google Earth to Pinpoint Environmental Hotspots
Enviromatics could contribute to Environmental Security
Autonomous Robots May Need Environmental Concerns
NASA-Developed Model to Help Reduce Famine
Computer Simulation Planned to Predict Where Epidemics Will Strike Next
Climate Change Computer Modeling
European New Web-based Air Pollution Monitoring System
Small Robotic Helicopters for Reconnaissance
Battle Simulators to Reduce Environmental Stresses from Military Exercises
Software algorithms for ecoterrorism prediction and simulations
Virtual Earth Simulation might help reduce environmental impact of military operations
Scientific Models Could Help Navy Avoid Whales During Sonar Tests
Future Computer-Human Interface Means Cyber Viruses Could Infect Humans
Proceedings of the Conference on Wearable Electronics
Robotics in the battlefield—"Well before the end of the century, there will be no people on the battlefield."
Serpentine Self-Healing Robot significantly reduces logistics tail translated to lighter environmental footprints and reduces the amount of battlefield waste
Self-Assembling Robots
Scorpion Robot for Complex Roving Missions
Roach-like Robots for Better Post-conflict Clean-up and Survivor Detection
Robots that Can “Recharge” by Eating
Progress on Self-replicating Robots
Robot Swarms
Nets of Agents Probe the Environment
On-chip Antenna to Solve Communication Problems among Microscopic Sensors
Silicon Nanospheres rank among hardest known materials
Environmentally Cleaner warfare: Energy on Targets vs. Metal and explosives on Targets needs environmental evaluation
Use off-switches for bio weapons
Models for Photochemical Pollution Assessment in Urban Areas
Software Package Monitors Buildings' Power
Google to Support Development of Early Warning System in Vulnerable Regions
New Web Site on Biomonitoring Technology

Predictive Conflict Modeling to be used for determining conflict high risk areas and improving policy for enhancing stability in those countries
Case studies suggest that the major sources of civil conflict that are associated with declines in available cropland and fresh water have been generated by the decreasing capacity of rural areas to maintain secure livelihoods and absorb growing labor forces. In the past, eruptions of civil tensions over cropland have been more common than over freshwater resources. While low per capita levels of land and water persist in several populous industrial countries, these countries – with their robust urban economies and well-run services – are much less vulnerable to civil conflict involving these resources. Tensions between states over renewable natural resources have most often developed over rights to ocean fisheries and transboundary freshwater supplies.
These tensions generally have led to interstate negotiations rather than warfare. Continued rapid population growth in the developing world, however, suggests a future unlike the past. The prospects for continued interstate cooperation, particularly over transboundary water rights, remain uncertain. Countries in high or extreme demographic stress categories for cropland or renewable fresh water were about 1.5 times as likely to experience civil conflict in the 1990s as countries that did not fall into these categories, suggesting a weak association between worsening scarcities of these critical resources, by themselves, and an increased likelihood of civil conflict. (February 2004) Ref.245

**UNEP and Google Earth to Pinpoint Environmental Hotspots**

The United Nations Environment Programme has joined together with Google Earth to highlight environmentally plagued regions of the world and to compare them to previous maps of the same regions. This technology grants millions of people around the world access to accurate, easily comprehensible, and timely visuals of rapidly changing environments. This information could help increase public awareness, as well as alerting authorities to prevent eventual security issues due to environmental changes. Additionally, dissemination of this type of information will be beneficial for capacity building, teaching, and stimulating action against environmental degradation. Presently, the “UNEP: Atlas of our Changing Environment,” offers satellite images of 100 environmental hotspots from around the world. Google Earth images are not real-time images but have all been taken in the last three years. The continual improvement and widespread use of the “Atlas of our Changing Environment” could provide unique opportunities to help prevent environmentally related conflicts. (September 2006) Ref. 246

**Enviromatics could contribute to Environmental Security**

MIT introduces and explains the emergence of a new field, enviromatics, born from the convergence of information technology and environmental research. Unlike environmental modeling based on statistical data, enviromatics uses real-time ecosystems-status database, Internet tools, and ubiquitous computers. Improved continuous sensing, simulation, and mapping tools make the predictions more reliable than previously. Instantaneous ecosystem analysis and short-term forecasting of ecosystems’ conditions is accessible to anybody interested. Possible applications of the new field range from farmers who could avoid eventual damages to their crops, to protection of endangered species that need special habitat conditions. Enviromatics could impact decisionmaking for improving forecasting implications of different action options, as well as increasing public awareness to foster more environmentally friendly practices. (May 2005) Ref. 247

**Autonomous Robots May Need Environmental Concerns**

Current work on intelligent battlefield robots by Ronald C. Arkin at Georgia Tech is focused on building into their programming regard for such elements as rules of engagement and the Geneva Convention. (November 2008) Ref.248

**NASA-Developed Model to Help Reduce Famine**

Researchers from NASA's Goddard Space Flight Center have developed a computer model to anticipate food shortages brought on by drought, combining data from satellite remote sensing of crop growth, and food prices. (July 2007) Ref.249
Computer Simulation Planned to Predict Where Epidemics Will Strike Next
World Health Organization researchers are developing a global epidemic simulator (GES) based on the model of climate monitoring systems. GES would record the location of disease outbreaks and their trajectory and then allow one to enter alternative mitigation measures to see the results. GES would integrate epidemiological and biological models of disease, to model the world’s disease status. The system would be connected to major elements of the built environments such as airlines, buildings, etc. to help spot outbreaks and the movements of people. WHO is seeking funding to complete the project. (April 2006) Ref. 250

Climate Change Computer Modeling

Climate scientists and modelers warn that climate change forecasting abilities are still relatively weak and that some of those considered in policymaking—such as the IPCC assessments—are highly debatable, being too conservative and not taking into account the latest research.

Climate modelers from around the world met at the World Modelling Summit for Climate Prediction, held in Reading (UK), May 6-9, 2008, to try to improve forecasting abilities, including measures that will allow a better understanding of how the climate will be affected locally as well as globally. At the end of the four-day summit, scientists made the case for a climate-prediction project on the scale of the Human Genome Project. A key component of this scheme would be a world climate research facility with computer power far beyond that currently used in the field. (May 2008) Ref.251

A group of climate scientists from NASA and Columbia University Earth Institute found that climate change is “close to critical tipping points, with potentially dangerous consequences for the planet.” In a related interview, Dr. James Hansen of NASA said that the point of no return might be reached as soon as in 10 years, if world governments fail to curb GHG emissions. He also noted that the IPCC report underestimated sea level rise, which, he warns, might reach 1-2 meters by the end of the century, if West Antarctic and Greenland melting are factored in. The Dangerous human-made interference with climate: a GISS modelE Study outlines two scenarios: ‘business-as-usual’, which shows disastrous consequences, and an ‘alternative scenario’ assuming controlled GHG emissions generating more moderate effects. (June 2007) Ref.252

Global warming will increase the risk of natural disasters over the next two centuries, even if harmful emissions were cut now, warn climate scientists from the University of Bristol's Department of Earth Sciences. Compiling data from more than 52 climate models looking at the impact of greenhouse gas emissions, the researchers calculated the risks induced by climate change to the world's key ecosystems based on levels of warming (less than 2°C (3.6°F) to over 3°C (5.4°F)) and for each group assessed the probability of changes in forest cover, the frequency of wildfires, and changes to freshwater supplies over the next 200 years. The findings are expected to be used to explore measures to reduce hazards as much as possible. (August 2006) Ref.253

A new study, Global temperature change, by a group of scientists, reveals that global surface temperature has increased approx.0.2°C per decade in the past 30 years, and the world is the warmest it has been in the last 12,000 years. Scientists estimate that pollution from human
activity, combined with the loss of snow and ice cover, will accelerate future temperature increase. Also, since warming is not uniform around the globe, the likelihood of strong El Niños and other harsh weather phenomena increases. A global temperature rise of approx. 1°C might represent a threshold with “dangerous” consequences, as sea levels rise and species become extinct. (September 2006) Ref.254

Strong correlation between global warming and severe storms is also revealed by a study based on more than 80 simulations using 22 sophisticated computer models of the climate system. The simulations show with 84% probability that for the period 1906-2005, human activity—mainly greenhouse gas emissions—are responsible for about two-thirds of the temperature increases in hurricane formation regions of the Atlantic and Pacific Oceans. The research team that produced the study includes 19 hurricane and climate scientists from ten research centers. (September 2006) Ref.255

A new index developed by scientists of the Swiss Federal Institute of Technology in Zurich, allows mapping the different ways that climate change will affect different parts of the world. This is the first map to show how global warming combined with natural variations in the climate would affect our planet, highlighting the frequency of extreme climate events—such as heat waves and floods—by 2100 compared with the late 20th century. It is intended to “help policy-makers gain a quick overview of the scientific facts without getting lost in the detail,” says Michèle Bättig, member of the team. (January 2007) Ref.256

New research and models by the National Center for Atmospheric Research and the University of Colorado's National Snow and Ice Data Center found that the Arctic could be seasonally free of sea ice by 2020, 30 years sooner than predicted by the IPCC report. In addition to all the consequences for the ecosystem and the Nordic inhabitants, this might accelerate even more global warming, as reflection of the sun’s heat and light will be strongly diminished. (May 2007) Ref.257

New computer climate models reveal Earth’s limits of CO₂ intake. The computer climate models developed by scientists from Berkeley Atmospheric Sciences Center, Woods Hole Oceanographic Institution, and the National Center for Atmospheric Research (NCAR) in Boulder, Colorado indicate that CO₂ absorption by land and oceans can not keep up with the current trends of increasing fossil fuel emissions, accelerating climate warming after the critical point is reached. The process is increased by drought and other phenomena already present. The paper explaining the findings, *Evolution of carbon sinks in a changing climate* was published in the Proceedings of the National Academy of Sciences (PNAS) of August 9, 2005.

Another computer model, also developed by scientists at the National Center for Atmospheric Research, simulates Earth's climate at the time of the greatest mass extinction in history, at the end of the Permian Era. It reveals that an abrupt and dramatic rise in atmospheric levels of CO₂ triggered the extinction of an estimated 90-95% of all marine species, and about 70% of all terrestrial species. "The results demonstrate how rapidly rising temperatures in the atmosphere can affect ocean circulation, cutting off oxygen to lower depths and extinguishing most life," says NCAR scientist and lead author, Jeffrey Kiehl. (August 2005) Ref. 258

Results of state-of-the-art climate models by Lawrence Livermore National Laboratory are
consistent with new observational estimates of temperature data obtained from satellites and weather balloons, providing compelling evidence that the tropical troposphere is warming since 1979. Human activity is considered as one important cause of the warming. [See also New Developments on Climate Change of January 2005 environmental security report.] (August 2005) Ref.259

**European New Web-based Air Pollution Monitoring System**

Users of the new Ozone Web released by the European Environment Agency can monitor and track ground level ozone across Europe. The Web site-based database is updated on an hourly basis with data from more than 500 air quality monitoring stations. Users can access the information on air quality in any part of Europe either by entering a place name or by clicking on a map of Europe. The Web site will also include information on the health implications of the respective ozone values. (July 2006) Ref. 260

**Small Robotic Helicopters for Reconnaissance**

Scientists from the University of South Florida have been surveying hurricane damage with a miniature battery-powered robot helicopter developed by iSENSYS, a spin-off from like90 LLC. This unit can operate by radio control at altitudes up to 300', over a quarter-mile radius. (December 2005) Ref. 261

**Battle Simulators to Reduce Environmental Stresses from Military Exercises**

The Department of Defense has just acquired two massive new simulation-oriented computer complexes, which should substantially reduce environmental stresses from large-scale battlefield exercises. Each cluster consists of 256 dual 3-GHz Linux processors; they will be delivered to the USAF Maui HPCC (Maui High Performance Computing Center) and ASC (Aeronautical Systems Center) CMSRC (Center Major Source Resource Center) at Wright-Patterson AFB, and will be used by the Joint Forces Command's Joint Experimentation Directorate (J9). These systems will allow large-scale, high-resolution combat simulations that weren't possible with the previous hardware. [See also previous AC/UNU Millennium Project environmental scanning items: Software algorithms for ecoterrorism prediction and simulations to improve environmental policy efforts, by identifying plausible futures linked to key environmental issues, August-September 2003; and Virtual Earth Simulation might help reduce environmental impact of military operations, March 2004.]

Related news: Sandia National Labs announced that they are assembling the world’s fastest yet smaller and most cost-effective supercomputer. Red Storm, the new supercomputer, is expected to become operational in January 2005. (August 2004) Ref. 262

**Software algorithms for ecoterrorism prediction and simulations to improve environmental policy efforts, by identifying plausible futures linked to key environmental issues**

DARPA research into information technologies that enable collaboration among teams of intelligence analysts, policy-makers and covert operators could make it possible for humans and computers to "think together" in real time to "anticipate and preempt terrorist threats." The development of inference network applications is a major step towards such a goal, and is forecast as occurring within two years. (August-September 2003) Ref.263
Virtual Earth Simulation might help reduce environmental impact of military operations
The U.S. Army has given a computer simulation company called “There” a contract to build a simulation of the Earth within four years to help it prepare for conflicts around the world. The simulation will use real-world terrain databases and include all aspects of a conflict situation, including surroundings and people (represented by avatars). A Baghdad section is to be ready in September of this year. The emphasis in the Baghdad simulation will be on human interaction rather than conflicts involving large quantities of military hardware. (March 2004) Ref.264

Scientific Models Could Help Navy Avoid Whales During Sonar Tests
Duke University biologists are developing scientific models based on sets of environmental parameters that could predict different marine species’ presence in proximity to sonar testing areas, helping to prevent eventual harm to the animals. The research was triggered when several whales of three species beached in January near Oregon Inlet just after a Navy training exercise used sonar at 240 nautical miles from Oregon Inlet. Although the incident might be a coincidence, the new model might help eliminate the possibility of such accidents. (February 2005) Ref. 265

Future Computer-Human Interface Means Cyber Viruses Could Infect Humans
As the human-computer interface continues to evolve into a continuum, it is reasonable to assume cyber viruses will one day be able to transfer into electronic components that will have been added into the human nervous system, and so have biological effects. Kevin Warwick, professor of cybernetics at Reading University, and a cyborg pioneer, warned that the emergence of computer-human connection and the production of synthetic viruses comes with great advantages, but also a huge risk: computer viruses will be able to infect augmented humans as they do PCs. (November 2004) Ref. 266

Proceedings of the Conference on Wearable Electronics
An insight into the current state of the field of wearable computing is available in the proceedings of the Fifth International Forum on Applied Wearable Computing, part of the ISWC 2008—12th IEEE International Symposium on Wearable Computing, held September 28–October 1, 2008 in Pittsburgh PA. (October 2008) Ref.267

Robotics in the battlefield—"Well before the end of the century, there will be no people on the battlefield."
Robotic elements are becoming a more and more significant part of the modern battlefield. By 2010 it is planned for the Stryker infantry vehicle to be equipped with an autonomous navigation system and other, application-oriented, "intelligent" facilities, and it will be only part of a complement of unmanned military vehicles and systems. One scientist in the field has predicted, "Well before the end of the century, there will be no people on the battlefield".
This trend will be enhanced by the increasing role of nanotechnology to produce tiny, intelligent pieces of equipment. These unmanned devices are involved with the battlefield environment in two ways: 1) as hazards to the environment, and 2) as environmental cleanup implements. They thus have two sets of connections with the body of environmental protection agreements and treaties. (March 2004) Ref.268

Serpentine Self-Healing Robot significantly reduces logistics tail translated to lighter
environmental footprints and reduces the amount of battlefield waste
British researchers have developed a self-healing robot that uses a shape memory alloy for propulsion and a genetic algorithm to adapt its mobility routines when dealing with damage to itself. Using these two features allows the robot to operate without external operator input and adapt to damage rather than being rendered incapable of completing its mission. (August-September 2003) Ref.269

Self-Assembling Robots
The M-TRAN II robot, developed by the Japanese Distributed Systems Design Research Group, represents a new generation of modular robots, with a flexible design able to rearrange itself into countless different shapes and create dramatically different patterns of movement. (March 2005) Ref. 270

Scorpion Robot for Complex Roving Missions
The Scorpion robot, developed by Frank Kirchner from the University of Bremen, Germany, is able to access difficult terrains that are inaccessible to larger, wheeled vehicles. A prototype is currently being evaluated at NASA's Ames Research Center at Moffett Field, CA. Although developed mostly for other planets’ exploration, the Scorpion robot could also be used on Earth, to investigate difficult or dangerous territories inaccessible to humans or larger vehicles. (February 2005) Ref. 271

Roach-like Robots for Better Post-conflict Clean-Up and Survivor Detection
Researchers at Stanford, Berkeley, and Poly-PEDAL labs designed the Sprawl family of hexapedal robots, based on the cockroach model. These robots are fast, stable, independent, and lower cost. They could be deployed for landmine detection and for survivor location in natural or other disasters. (July 2004) Ref. 272

Robots that Can “Recharge” by Eating
Researchers at the University of the West of England, Bristol, are working on creating robots with artificial digestive systems and corresponding metabolisms that would allow robots to ‘eat’ to recharge their electrical needs. The robots would collect bacteria from sewage sludge, break it down into sugars, and convert the biochemical energy into electricity that powers the robot. (January 2005) Ref. 273

Progress on Self-replicating Robots
A team of engineers from Cornell University in Ithaca NY, has created robots that can self-replicate similarly to biological cloning. At this stage, they are just simple sets of 4 modular robot cubes, "molecubes", which are able to assemble copies of themselves, when provided a supply of pre-made cubes. Yet, they represent an important step forward compared to previous self-replicating robots, due to their flexibility, “memory”, and three-dimension movement possibility. (May 2005) Ref. 274

Robot Swarms
Advances in robotics and artificial intelligence make possible the development of large “swarms” of cheap robots that range in size for a broad set of applications. Operating off simple individual instruction sets, swarms of robots can nevertheless potentially interact in a complex
manner, performing a myriad of tasks, including a number of supporting environmental missions. The ability to produce large quantities of simple robots that interact with each other decreases the unit costs of robotics and potentially increases the number of tasks that such swarms can perform. (June 2004) Ref. 275

Nets of Agents Probe the Environment
An important branch of Enviromatics is concerned with the acquisition of environmental data. Several current projects (Univ. of Wyoming, Univ. of Pennsylvania, UCLA) are developing variations of advanced data acquisition techniques. These are based on large networks of small intercommunicating devices (agents), incorporating sensors, which can monitor wide areas for environmental data, process it, and transmit results back to a central point. These devices may be stationary—laid out in a grid pattern over the region of concern—or they can be a band of mobile robots swarming over a large area in an internally controlled search for sites and information of interest. Individual units might be specialized; e.g., for radiation, biological weapons, or chemical weapons. The key element here is the combination of individual autonomy, in which each device "runs itself", and intercommunication, which permits low-power wireless transmission of data and plans around the network. In this way the assemblage of units can behave in a seemingly intelligent manner, adjusting its behavior to changing conditions or surroundings. A flight of migratory birds, maintaining its V-shape, is the classic example of this kind of emergent behavior, demonstrating that, in fact, the whole can be greater than the sum of its parts. (May 2005) Ref. 276

On-chip Antenna to Solve Communication Problems among Microscopic Sensors
University of Florida electrical engineers have installed a radio antenna less than one-tenth of an inch long on a computer chip and demonstrated that it can send and receive signals across a span of several feet. By covering a large area with a number of such radio chips, each powerful enough to transmit information to the next radio, one can create a single large network that could be monitored from a distance. (May 2004) Ref. 277

Silicon Nanospheres Rank Among Hardest Known Materials
Measurements made at the University of Minnesota and confirmed at the Los Alamos National Laboratory have shown that silicon nanospheres (12 nm) have hardness falling between sapphire and diamond. This raises the possibility of producing superhard materials from this form of matter. It might eventually be considered an alternative to depleted uranium. (March 2003) Ref. 278

Environmentally Cleaner warfare: Energy on Targets vs. Metal and Explosives on Targets Needs Environmental Evaluation
Although new energy weapons are expected to come into use and such weapons do not appear to be an environmental problem compared with metal and explosives, their environmental impact has still to be assessed compared to previous weapons impacts. Variations of these energy weapons that cause short duration pain have also been suggested in crowd control. Since these kinds of weapons present a new category of arms, it is reasonable to anticipate that eventually new rules for their control will emerge. (February 2003) Ref.: 279
Use **off-switches for bio weapons**
Just like land mines now have “off-switches, there is a need to develop “off-switches” for bio-weapons. (August 2002) Ref.: 280

**Models for Photochemical Pollution Assessment in Urban Areas**
A new multimedia mass balance model might improve knowledge and therefore actions concerning volatile organic compounds (VOC) that may impact the ozone in urban environments. The model can estimate VOC’s emission source, level and fate, thus helping to focus resources and regulation efforts on VOCs of major concern. The authors underline though that the model’s outcome should be complemented by better quantification of certain parameters. This work was funded by the American Chemistry Council, and the study was published in *Atmospheric Environment* (subscription required). Ref. 281

**Software Package Monitors Buildings' Power**
The Sun Flow Monitor System software package marketed by Live Data Systems, Inc., Branchburg NJ, monitors a building’s power sources, conventional or alternative, and its building management systems. This new software produces reports, which can aid in minimizing the structure’s environmental demand. (July 2007) Ref. 282

**Google to Support Development of Early Warning System in Vulnerable Regions**
Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced $25 million in grants aimed at addressing global challenges. One of the five core initiatives, ‘Predict and Prevent’ aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying ‘hot spots’ and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated $5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University. (January 2008) Ref. 283

**New Web Site on Biomonitoring Technology**
The Environmental Health Research Foundation (EHRF) launched a new web site that is providing comprehensive information on Biomonitoring,” the scientific technique for assessing human exposure to natural and synthetic chemicals http://www.biomonitoringinfo.org. (May 2005) Ref. 284

**New Detection and Cleanup Techniques**
New and much more sensitive chemical and biological detection techniques will greatly assist in post-incident clean-up and will provide faster and more accurate monitoring of possible environmental violations. The cleanup effort, once a problem has been detected, may now be supported by new work that has produced both plants and microbes that selectively destroy or segregate hazardous or polluting elements.
FAO/IAEA Meeting Discusses Portable Disease Detection Devices
Portable Mass Spectrometer and Gas Chromatograph
Single-electron Transistors (SETs) and NEMS Make for New High-performance Sensor
New Substrate Preparations Make for Inexpensive “Labs on a Chip”
Miniature Radiation Sensors Could Implement Detection Network
New Techniques for Multi-nanowire Detection Arrays
Nanotube-based Biosensor Sensitive to Trace Amounts
New Biological Discovery Should Bring More Efficient Water Treatment
NanoRadio Offers Low Impact Environmental Monitoring and Communications
New Technique Might Power Nano-based Environmental Devices
Ionic Liquids Provide Safe Alternative to Mercury
Single-walled Carbon Nanotubes Give Support to Antimicrobial Enzyme
Nanotube-based Coating Repels Water to Achieve Self-cleaning Surface
Emerging Contaminants: Most Effective Treatment Strategies
Synthetic Biology to Combat Harmful 'Biofilms'
Nanowire “Paper” Selectively Absorbs Oils in Water
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Portable Sensor to Detect Exposure to Chemical or Nerve Agents
Miniature Chemical Agent Sensor
New Rapid Portable Chemical Sensor
Model Helps Evaluate Performance of Biosensors
Antibody-bearing Gel Can Disinfect Biologically Contaminated Areas
New Studies of Bacterial Oil Degradation in Contaminated Soil
New Bacterium Can Provide Arsenic Cleanup and Possibly Detection
Improved Technique for Removing Heavy Metals from Water
Reusable Hydrogels Detect and Remove Heavy Metals from Contaminated Water
New Deep Water Marine Sensors Being Developed
New Treatment Improves Congo Red Decontamination
Reusable Carbon Aerogel Adsorbs Organic Solvent Pollutants
Advance in Assessing Metabolites of Diesel Exhaust component 1-nitropyrene in Humans
Landmine Detection by Using Ground-penetrating Radar Technique
Porous Semiconducting Aerogels Purify Water and Hydrogen
Water Purification Techniques
Millimeter-wave Spectroscopy Provides Environmental Sensing
New Chemical Helps Protect Burned-over Soil from Erosion
New Technique Promises Ultra-sensitive Biosensors
EU Launches Mobile Carbon Tracking
New Approach May Ease Uranium Decontamination
New Material Strips out Radioactive Debris
New Type Nanoscale Transistor Would Aid DNA Detectors
DNA Spotted Microarrays Provide Faster Pathogen Identification
Chemical Tests on Cells Rather than Animals
Nanotech-based Explosives Detector
Detector Materials for Cyanogen Halides from Chemical Weapons
New Spectroscopy Technique Speeds Up Virus Detection
Nanofibrils Film Improves Explosives Sensing Performance
Bacterial Proteins Help Nanoparticle Cleanup
Fluorescent Sensor Bacteria Offer Fast Pollutant Detection
New Material Has High Absorbency for Organic Solvents
New Production Technique for Nanofiber Filters for Chemical Warfare Protection
Sugar-coated Nanotubes Stop Anthrax Inhalation
New Spectroscopy Sensor for Environmental Monitoring
Nanocantilevers for Ultra-small Sensors
Digital Magnetofluidics Improves Biochemical Analysis
Biosensors Sniff out TNT and Possibly Other Dangers
Reliable Anthrax Antibodies Developed
Bar-coded Nanowires May Yield Small, Fast Bio Detectors
New Low-cost System for Bacteria Identification
Quantum Dot Device Provides Fast Detector for DNA Sequences
Sensicore’s Lab on a Chip Water Profiler Automates Lab Functions
Deep Cooling Improves Uranium Detection
Biodetecting Wipes
Fish Provide Early Warning of Toxic Chemicals
Ultrasound Soil Cleanup Technique
New Surface Decontamination Method
Virus Detection Technique—Fast, Convenient, and Sensitive
New Technique for DNA Isolation
Sensitive Uranium Detector Using DNA
New and Improved Water Purification Method
Microbes Can Help Build Nanodevices for Detection
High Sensitivite Portable Chemical Detection Device
Piggybacking Environmental Sensors on Communications Gear
Very Low Cost Chemical Sensors for Environmental Monitoring
Nanobarcodes for Multiple Pathogen Detection
Bacteria Used to Eliminate Perchlorate from Water
New Oil Remediation and Recovery Technique
New Efficient Energy-free Technique for Oil Removal from Water
DNA-Wrapped Nanotube Sensors
Sugar-Coated Gold Nanoparticles Detect Toxins
Fast Bacteria Detection from Bacteriophage/Quantum Dot Complexes
Anti-Anthrax Found
New Microcantilever for Biochemical Detection
Chopped-up DNA Strands Speed Bacterial Identification
New Spectroscopy Technique with Superior Results
Laser-tracked Honeybee Detect Landmines
Real-Time Antibody-based Bioterrorism Detection System
Russian Discovery of New Bacterial Cleanup Technique
A Radioactive Element's Rate of Decay Has Been Speeded Up
Nanoshells Dramatically Improve Sensing Capability
Iron Nanoparticles for Environmental Cleanup
Dirty Bomb Clean-Up Technology for Porous Structures
New and Improved Land Mine Destruction Technique
Bionanotech Particles Can Detect Bacteria in 20 Minutes
Chemical Probe Offers Fast Detection of Ricin
Nanodevices for Biomolecules Detection
Nanotubes that Detect and Kill Biological Agents
Nano-engineered Powders Tackle Toxic Chemicals
Smart Dust could be used to monitor and/or detect hazardous chemical or biological agents in the water and air
Bacterial Integrated Circuits
Military Applications of Silicon-Based Ultraviolet Sensors
Technology for Perchlorates Cleanup
Motion Detector Allows Naked Eye to See Motion of 10 Nanometers
Designer Bacteria Could Help Cleanup Pollution and Produce Hydrogen
New More Efficient Microbial Fuel Cell Cleans Wastewater and produces Hydrogen
Sunlight-powered System for Cleaning Water and Produce Electricity
Proposed T-Rays (TeraHertz) Devices Could Detect Almost Anything
Automated Water Safety Sensor Units
Arsenic-polluted Water Decontamination Using Sulphate
Water Nanofilters
Sandia National Laboratories funded to develop improved Desalination and Arsenic Removal Technology
Low-cost, Non-polluting Sewage Treatment System
New diamond film connects electronics and biology for on-going bio-alert systems
New chip speeds field detection of specific DNAs
On-chip antenna to solve communication problems among microscopic sensors
Miniature spectrometer can detect biological hazards
Detecting chemical threats with "intelligent" networks
Invention of a new multisensor system required to speed up landmine clearance
Hand-Held Chemical Analysis and Detection System can identify the presence of some hazardous chemical or biological agents
Muon Technology can help detect smuggled nuclear material
Molecular Pattern Matcher for Chemical Detection
New production process for gold nanoparticles make biosensors less costly
Nanoscale Iron Particles as an environmental cleanup technology by reducing toxic chemical and heavy metals into less toxic compounds
Nanoporous Ceramic uses for heavy metals cleanup
Nanotubes could be used to detect nerve gas and other chemical warfare agents
Bacterial Conversion of soluble uranium to insoluble uraninite might eventually be used to clean heavily contaminated sites

Artificial organisms and/or genetically engineered living bacteria used in cleanup operations

Microbes as part of post-battle field clean up

Pollution-eating microbe may help clean up

Manure Aids in Removing Hydrogen Sulfide from Biogas

Transgenic Plants to Help Decontaminate the Environment

Aquatic Plant Removes POPs from Wetlands

Bacteria-modified Yellow Lupine to Remove Toluene from Soil

Implementation Steps for Landmine Control Convention: New Genetically Modified Plant to Detect Landmine Explosive

Invasive species of genetically modified animals for reconnaissance and/or cleanup

Flower-power could help clear landmines

Polymer Nanofibers Provide Chemical Warfare Defense

**FAO/IAEA Meeting Discusses Portable Disease Detection Devices**
A five-day meeting in Verona, Italy discussed new mobile rapid disease detection technology that experts say could revolutionize the fight against bird flu and many other livestock disorders. One of the topics at the conference, sponsored by the Joint FAO/IAEA Programme, a Vienna-based partnership between FAO and the International Atomic Energy Agency, was a $1,000 mobile test system and reader the size of a small portable television. Further work is in progress to reduce it to what researchers call a "laboratory in a pen". (March 2007) Ref. 285

**Portable Mass Spectrometer and Gas Chromatograph**
Researchers at Brigham Young University in Utah have developed a portable mass spectrometer and gas chromatograph for detecting biological and chemical agents. This easy to use and portable instrument can analyze a sample and—based on an internal library of known chemicals and biological agents—identify the material and the level of danger. The researchers intend to create a palm-sized version of the device. (March 2007) Ref. 286

**Single-electron Transistors (SETs) and NEMS Make for New High-performance Sensor**
A team at the School of Electronics and Computer Science at the University of Southampton, England, part of the EU FP-7 NEMSIC project, is developing an extremely small, high-performance, low-power sensor in silicon which will have applications in biosensing and environmental monitoring. The device co-integrates single-electron transistors (SETs) and nano-electro-mechanical systems (NEMS) on a common silicon technology platform to produce the smallest sensor offered so far. (July-August 2008) Ref.287

**New Substrate Preparations Make for Inexpensive “Labs on a Chip”**
Professor George Whitesides and colleagues of the Dept. of Chemistry at Harvard University have developed an inexpensive way of turning a sheet of paper into a microfluidic “lab on a
chip” medium for bioassays. The technique is based on soaking the sheet with a hardenable photoresist, covering it with a transparency containing a drawing of the desired pattern of channels, and exposing it to light, rendering it impenetrable except in those areas shielded by the drawing. An analogous scheme is used by Aaron Wheeler of the University of Toronto to inexpensively make copper molds for plastic microfluidic chips. In his method, a pattern is inked directly onto a sheet of copper before a chemical is used to etch away a thin layer from exposed areas, leaving behind the mold pattern for the network of channels. (October 2008) Ref.288

**Miniature Radiation Sensors Could Implement Detection Network**
Scientists at Purdue University are working on developing a miniaturized radiation detection device that is small enough to fit into a mobile phone. Their suggestion is that a population carrying such embedded devices, together with software and communications subsystems, could serve as a networked system for the detection of radiological hazards such as “dirty bombs”. (October 2008) Ref.289

**New Techniques for Multi-nanowire Detection Arrays**
A team from the Electrical Engineering Department at Pennsylvania State University has developed an improved, potential mass production technique for assembling detector nanowires into an array on a silicon chip, using an electric field. Once in place, with electrodes on top of them, the set of treated wires yields a portable and very sensitive detector for multiple toxins or pathogens. A nanowire detectably changes its conductivity when a target substance (say, a toxin) binds to the specific complementary coating on the wire. Harvard chemist Charles Lieber earlier devised a competing technique to line up nanowires using polymer bubbles, and Prof. Mark Reed at Yale attacked the problem using an etching process. (January 2009) Ref. 290

**Nanotube-based Biosensor Sensitive to Trace Amounts**
Early Warning Inc. of Troy NY has licensed from NASA’s Moffett Field Ames Research Center technology for a nanotube-based biosensor sensitive to trace amounts of specific bacteria, viruses and parasites. According to a company release, “The biosensor works when a single strand of nucleic acid comes into contact with a matching strand of nucleic acid attached to the end of an ultra-conductive nanotube. The matching strands form a double helix that generates an electrical signal, which is used to determine the presence of specific microorganisms in the sample. Because of their tiny size, millions of nanotubes can fit on a single biosensor chip allowing identification of very low levels.” (May 2008) Ref.291

**New Biological Discovery Should Bring More Efficient Water Treatment**
Scientists at the Environmental Biotechnology Cooperative Research Centre (EBCRC), Eveleigh NSW, Australia, have discovered a cell signaling pathways that can control bacterial slime on membranes, which will lead to more efficient desalination and water recycling plants. According to the project leader, “Membrane fouling is one of the greatest contributors to increased energy usage and cost in the desalination and water recycling processes. Reducing fouling will significantly decrease operating costs through reduced energy consumption, a reduction in chemical usage and an overall reduction in a plant’s environmental footprint”. This signaling system initiates dispersal in established fouling biofilms and prevents the formation of new biofilms. EBCRC is developing a range of biofilm control formulations that will stimulate natural bacterial dispersal events. (October 2007) Ref.292
NanoRadio Offers Low Impact Environmental Monitoring and Communications
Prof. Alex Zettl of the Univ. of California’s Berkeley Nanosciences & Nanoengineering Institute and his group have developed a nanoscale radio, in which the key circuit consists of a single carbon nanotube. This work derived from an effort to create inexpensive wireless environmental sensors. (April 2008) Ref. 293

New Technique Might Power Nano-based Environmental Devices
Researchers at the Georgia Institute of Technology have developed a microfibre–nanowire hybrid structure for energy scavenging. According to the abstract, “Solar, thermal and mechanical (wind, friction, body movement) energies are common and may be scavenged from the environment”, and the Editor’s Summary describes their work as “a system that converts low-frequency vibration/friction energy into electricity using piezoelectric zinc oxide nanowires grown radially around textile fibres. By entangling two fibres and brushing their associated nanowires together, mechanical energy is converted into electricity via a coupled piezoelectric-semiconductor process. This work shows a potential method for creating fabrics which scavenge energy from light winds and body movement.” (February 2008) Ref. 294

Ionic Liquids Provide Safe Alternative to Mercury
Robin Rogers of Queen's University, Belfast, UK, and his colleagues have discovered that ionic liquids (IL)—salts in liquid form—are an environmentally safe substitute for mercury in thermometers. Gary Baker, of the Oak Ridge National Laboratory in the U.S., also points out that ILs are potentially green replacements for conventional solvents in other applications. (March 2008) Ref. 295

Single-walled Carbon Nanotubes Give Support to Antimicrobial Enzyme
A team of researchers from the Samuel Ginn College of Engineering at Auburn University produced antimicrobial coatings that have the potential to prevent diseases from spreading on contaminated surfaces. They mixed a lysozome solution with physically strengthening single-walled carbon nanotubes, and used layer-by-layer deposition to produce an inherently antimicrobial surface. (July-August 2008) Ref. 296

Nanotube-based Coating Repels Water to Achieve Self-cleaning Surface
A research team led by Ayyappanpillai Ajayaghosh at the National Institute for Interdisciplinary Science and Technology in Trivandrum, India, developed a coating that produces surfaces so hydrophobic that a 2° slope causes water droplets to run off them, taking dust and other contaminants with them. The treatment is a dispersion of carbon nanotubes that coated with para-ethylene vinylene, a highly hydrophobic molecule. (July-August 2008) Ref. 297

Emerging Contaminants: Most Effective Treatment Strategies
Endocrine disruptor chemicals (EDCs) and pharmaceuticals and personal care products (PPCPs) have been discussed as emerging issues for water supply and wildlife protection for more than a decade. The American Water Works Association’s (AWWA) May 2008 Opflow carries an article describing three processes for treating these substances in public water supplies. Additionally, AWWA has added a special session to its June 8-12, 2008 annual conference in Atlanta, Georgia. Taken together, these indicate that public and water industry interest in
remedial action has run ahead of legislation and regulation – leaping over at least one of the common four steps through which an issue progresses in evolving from a scientific discovery to become a societal action item. The three processes discussed in the article are: additional processing of wastewater effluents, reverse osmosis treatment of potable water, and combined ultraviolet/reverse osmosis treatment of potable water. (May 2008) Ref. Ref.298

**Synthetic Biology to Combat Harmful 'Biofilms'**
A team of researchers from MIT and Boston University has genetically engineered an E. coli bacteriophage to produce an enzyme that degrades the biofilm that the bacterium often produces and which interferes with the action of the phage. The researchers applied this technique to E. coli biofilms, (producing a hundred-fold phage performance improvement) but they believe that their approach can be used with many other bacteria. For example, it might be possible for a modified anthrax bacteriophage to be sprayed on an area affected by anthrax, and then wiped off. (July 2007) Ref.299

**Nanowire “Paper” Selectively Absorbs Oils in Water**
Prof. Francesco Stellacci, of MIT’s Department of Materials Science and Engineering, and colleagues have developed a paper-like membrane comprising a mat of potassium manganese oxide nanowires. The new (and inexpensive) material is completely impervious to water but can absorb up to 20 times its weight in oil or other hydrophobic substances, and can be recycled indefinitely often by heating it to evaporate the oil. (June 2008) Ref.300

**Carbon-gold Nanoparticle Sacs Trap Oil Droplets**
Rice University’s Pulickel Ajayan, Professor of Mechanical Engineering and Materials Science, and his research team have developed carbon-gold segmented nanowires that assemble to form BB-sized sacs around droplets of oil in water. (June 2008) Ref.301

**More New Improvements in Nanotube-based Environmental Sensors**
In a paper published in the online edition of *Angewandte Chemie*, Michael Strano, Associate Professor of Chemical Engineering at MIT, and his team describe a new highly sensitive technology for detecting gases in the environment. The system consists of carbon nanotubes, whose conductivity selectively changes when a gas binds to them, coupled with a miniature gas-chromatography column etched onto a silicon chip. The column separates the different gases in the environment before they reach the nanotubes, to achieve a sensitivity of 25 parts/trillion. A further improvement adds a coating to the tubes which causes the gas molecule to detach a few milliseconds after attaching, allowing the movement of the triggering component to be tracked as it moves. (June 2008) Ref.302

**Tiny Cantilevers Detect Contaminants**
Prof. Anja Boisen and colleagues at the Department of Micro- and Nanotechnology, Technical University of Denmark, have created a detection device for contaminants, based on the change in resistance of a cantilever, 40×200 microns in size, when a contaminant molecule or bacterium binds to its antibody-coated surface and bends it. A variation works by using a similar element as the lid of a pigment-containing box, so when the strip bends, it releases a detectable color. (July 2007) Ref.303
Chemical Agent Cleanser Developed in Canada
A new non-toxic method for rapidly and safely destroying toxic agents, such as chemical weapons and pesticides, has been developed by researchers from Queen’s University, Canada. The alcohol-based system is non-corrosive, acts within minutes, and proved to be more than 99% effective in eliminating organophosphorus agents, such as Tabun, Soman and VX. It might represent a safe and environmentally friendly option for destroying stockpiles of chemical weapons, environmental spill cleanup, and rapid response to possible terrorist attacks using chemical weapons agents. It is safe in most conditions and has no special storage requirements. (April 2008) Ref.304

Animal-Robot Team Effective for UXO Clearance
Animal-robot teams can be a safe and efficient alternative for post-conflict area scanning and clean-up. A remotely controlled robot leading a dwarf mongoose (Helogale parvula) trained to sniff out explosives is an approach demonstrated by Thrishantha Nanayakkara and colleagues at the University of Moratuwa in Sri Lanka. The group APOPO in Tanzania has been training Gambian giant pouched rats for similar manually-led operations, but the robot guidance eliminates the human risk factor. The two animals mentioned are more easily trained and perform better than dogs. (April 2008) Ref.305

Portable Sensor to Detect Exposure to Chemical or Nerve Agents
The U.S. Pacific Northwest National Laboratory is developing a portable sensor able to identify exposure to chemical or nerve agents by testing blood or saliva samples. The device will be based on higher sensitivity test strips. Its development is funded by the National Institutes of Health and the project is estimated to take five years. (August 2007) Ref.306

Miniature Chemical Agent Sensor
Gas chromatography and mass spectrometry devices for detection of various dangerous gases are being further reduced in size, while their sensitivity and rapidity of reaction is increasing. The prototype of a new tiny device produced results in about four seconds from minimal gas amounts and operates on limited amounts of power. The sensor, developed by researchers from MIT, Cambridge University, University of Texas at Dallas, Clean Earth Technology and Raytheon, is expected to be completed in the next two years. (January 2008) Ref.307

New Rapid Portable Chemical Sensor
Guardion-7, a 28-pound, briefcase-sized unit is a portable chemical sensor that can identify nerve agents, explosives and other substances within five minutes, with high accuracy, even in extreme climates, apparently without false-positive readings found in current sensors. It was developed by Brigham Young University scientist Milton Lee and has been successfully tested at the Dugway Proving Ground in Utah. The U.S. Defense Threat Reduction Agency certified its accuracy in February. Research continues to make the device even smaller and lighter. (March 2008) Ref.308

Model Helps Evaluate Performance of Biosensors
A new modeling technique allows the study of miniature biosensors used to identify pathogens, DNA or other substances. The technique, developed by scientists of the School of Electrical and Computer Engineering at Purdue University, comprises a new conceptual framework and
corresponding computational model to relate the shape of a sensor to its performance and explain why certain designs perform better than others. (January 2008) Ref.309

**Antibody-bearing Gel Can Disinfect Biologically Contaminated Areas**
The Ectoplasm Project is developing an environmental cleanup material consisting of a polymer solution that contains antibodies to a biological agent, like anthrax. It is being developed by Anadis, of Melbourne, Australia, with funding from the Research Support for Counter Terrorism (RSCT) Programme. The antibody–based gel will allow decontamination teams to spray a possibly contaminated area with the substance, for biohazard detection, containment, and decontamination. The gel layer can be stripped off surfaces without damaging them, and discarded using safety precautions. The substance is expected to be ready for use in field operations worldwide within two years. (August 2007) Ref.310

**New Studies of Bacterial Oil Degradation in Contaminated Soil**
Two papers in the recent issue of the African Journal of Biotechnology report on studies, one in Nigeria and one in Kwazulu-Natal, of bacterial degradation of oil in contaminated soil. The latter research found five indigenous bacteria that degraded diesel by more than 85% within two weeks. (July-August 2008) Ref.311

**New Bacterium Can Provide Arsenic Cleanup and Possibly Detection**
Thomas Osborne and Joanne Santini from University College, London presented a paper at the Society for General Microbiology’s autumn meeting announcing the discovery, at Yellowknife NWT, Canada, of a bacterium which converts arsenic in water from arsenite to much more easily removable arsenate, even at very low temperatures. The researchers also hope that an enzyme enabling the development of an arsenic biosensor can be isolated from these new strains of bacteria. [See also Arsenic-polluted Water Decontamination Using Sulphate in November 2004 and Transgenic Plants to Decontaminate the Environment (removes arsenic from contaminated soil) in the October 2002 environmental security monthly reports.] (September 2008) Ref.312

**Improved Technique for Removing Heavy Metals from Water**
Scientists of the Research Center for Eco-Environmental Sciences of the State Key Laboratory of Environmental Chemistry and Ecotoxicology, Chinese Academy of Sciences in Beijing, developed an improved technique for removing heavy metals from water. Fe3O4 magnetic nanoparticles coated with humic acid are added to the water; they adsorb heavy metals, and are then removed with magnets. Their innovation is the use of the humic acid coating to prevent the particles from aggregating or oxidizing, while the acid itself combines with heavy metal ions. (July-August 2008) Ref. 313

**Reusable Hydrogels Detect and Remove Heavy Metals from Contaminated Water**
Scientists at the Department of Chemistry, University of California at Berkeley developed a group of low cost protein-cross-linked hydrogels, incorporating pea metallothioneins, for the detection and sequestration of heavy metal ions, such as cadmium, in contaminated water. The compounds shrink upon absorbing metals, providing a detection capability, and can be reused after the bound metal ions are removed by chelation. The researchers are also working on applying the same technique to other types of pollutants. (December 2008) Ref. 314
New Deep Water Marine Sensors Being Developed
Prof. Hywel Morgan from the UK’s University of Southampton’s School of Electronics and Computer Science and Dr. Matt Mowlem at the National Oceanography Centre, Southampton, have performed initial testing of new technology marine sensors that are “capable of measuring harsh environments [and] can be deployed for months at a time”, according to a University announcement. The four-year project’s two goals are said to be “to develop lab-on-a-chip chemical and biochemical analyzers to detect nutrients and pollutants at the ultra-low concentrations found in the ocean, and to develop small chips to identify individual phytoplankton in the oceans”. The researchers foresee applications wherever the condition of environmental water needs to be assessed. (January 2009) Ref. 315

New Treatment Improves Congo Red Decontamination
K.P. Gopinath of the Dept. of Chemical Engineering, A.C. College of Technology, Anna University, Chennai, India, and colleagues reportedly have developed an improved technique for the degradation of the toxic pollutant Congo Red. The method uses sonolysis as pretreatment followed by biological treatment with Bacillus sp. Sonolysis is the breaking of chemical bonds with sound. (September 2008) Ref 316

Reusable Carbon Aerogel Adsorbs Organic Solvent Pollutants
A monolithic carbon aerogel that will adsorb organic solvent pollutants such as benzene, toluene and xylene, and that can be easily regenerated and used repeatedly has been produced by David Fairén Jiménez and other researchers at the Univ. of Granada in Spain. (March 2008) Ref.317

Advance in Assessing Metabolites of Diesel Exhaust component 1-nitropyrene in Humans
Researchers at Kanazawa University and the University of Washington reported developing a method for measuring metabolites of 1-nitropyrene (1-NT) in human urine. 1-NT is abundant in diesel exhaust particulates and a significant mutagenic agent. This appears to be a breakthrough in the quest for ways to evaluate human health effects of diesel engine emission inhalation. (August 2007) Ref.318

Landmine Detection by Using Ground-penetrating Radar Technique
A wide-band earth-penetrating radar offering promise of improved capability for landmine detection was developed by A. G. Yarovoy, P. van Genderen, and colleagues at the International Research Centre for Telecommunications-transmission and Radar of the Delft University of Technology, the Netherlands. (August 2007) Ref.319

Porous Semiconducting Aerogels Purify Water and Hydrogen
Scientists of the Argonne National Laboratory, together with colleagues at Northwestern and Michigan State Universities, have developed chalcogenide-based porous semiconducting aerogels which efficiently (99.99%) remove contaminants like heavy metals from water and also filter out catalyst-poisoning impurities from hydrogen intended for use in fuel cells. (August 2007) Ref.320

Water Purification Techniques
Researchers at the University of Nottingham have developed a technique that uses bacteria to consume contaminants that build up on the membranes used in some water purification systems.
This allows the filters to be cleaned within the closed system, without removing the membranes. In another advance, researchers at the University of South Australia have developed a low cost, efficient technique for removing organic material from water. It involves the use of silica particles coated with a nanometer-thin layer of active material based on a hydrocarbon with a silicon-containing anchor. The coated particles are stirred in the contaminated water for up to an hour and the powder is then filtered out. (February 2008) Ref.321

**Millimeter-wave Spectroscopy Provides Environmental Sensing**

Scientists from the Argonne National Laboratory developed a new technology, passive millimeter-wave spectroscopy (PmmWS), which can detect specific molecules in concentrations as low as 100-1000 ppm at ranges of up to a few kilometers. The new system improves on earlier ones by being less susceptible to interference from clouds and other atmospheric phenomena, having a much longer range, and being less expensive. (September 2007) Ref.322

**New Chemical Helps Protect Burned-over Soil from Erosion**

ENCAP of Green Bay WI, a lawn care small business, introduced a new product, PAM-12, that claimed to be more effective and less costly in treating flame- and smoke-damaged soil than previous approaches so that it becomes more absorbent and less susceptible to erosion. It does this by causing the soil to form into tiny clumps around which water will flow instead of running off, aiding in the process of restoring the natural environment for vegetation re-growth. (September 2007) Ref.323

**New Technique Promises Ultra-sensitive Biosensors**

Scientists at MIT, led by Ned Thomas and Patrick Doyle, have developed a technique for producing millions of bar-coded 3D latticework microparticles in which DNA or other biotags can be attached. According to an announcement, “With conventional solid microarrays and particles, biotags only adorn the probe's surface. In contrast, biotags can attach inside the latticework particles, increasing the number of target molecules that bind to a particle, and therefore producing a more intense fluorescent signal”. The developers believe this technique may increase the biosensing device’s sensitivity by a factor of 10,000. Commercialization of this diagnostic tool is expected within two years. (December 2007) Ref.324

**EU Launches Mobile Carbon Tracking**

The mobGAS program is a personal mobile phone application that enables users to learn the amount of greenhouse gases produced by their daily activities. The software is available in 21 languages and is free to download to a mobile phone. Users can input daily activities and calculate the daily, weekly, and yearly emissions via a secure website. The system compares the user’s emissions with national and world averages. The system was developed by the Joint Research Center of the European Commission to help raise public awareness and motivation to reduce GHG emissions. (December 2007) Ref.325

**New Approach May Ease Uranium Decontamination**

A new technique may lead to methods for removing dissolved uranium (e.g., from depleted uranium munitions) from liquids, such as groundwater. The method uses large organic molecules called macrocycles that essentially envelop a uranyl ion (\((UO_2)^{2+}\)), leaving one of its oxygen atoms exposed, showing that the normally strong bond between the uranium and oxygen has
been weakened. The scientists, Polly Arnold and Jason Love of the University of Edinburgh, believe “that the uranyl ion's bonds can be loosened is a first step towards finding substances that can transform dissolved uranyl into an insoluble compound.” The macrocycle is destroyed by water, so further work will be necessary to produce a practical decontamination technique. (January 2008) Ref.326

New Material Strips out Radioactive Debris
Scientists at the U.S. Department of Energy’s Argonne National Laboratory and Northwestern University developed a layered sulfide compound, which very efficiently strips out radioactive strontium-90 from nuclear waste. They are now experimenting with the compound’s ability to isolate such other common radioactive elements as cesium and uranium. (March 2008) Ref.327

New Type Nanoscale Transistor Would Aid DNA Detectors
A mathematical simulation developed by Samuel Afuwape of National University, in San Diego, helps to design a new type of nanoscale transistor for a portable DNA detector for testing contaminated sites. The new nanoscale ion-selective field-effect transistor (ISFET) could be integrated into a biosensor containing thousands of DNA sequences that would bind with DNA sequences in a sample, producing changes in conductivity detectable by the ISFET. The miniature DNA detector would have broad application, including bioweapons detection. (March 2008) Ref.328

DNA Spotted Microarrays Provide Faster Pathogen Identification
Prof. Sanjeev Narayanan, of the Dept. of Diagnostic Medicine and Pathobiology, College of Veterinary Medicine at Kansas State Univ., and his colleague, Greg Peterson, reported having developed a DNA spotted microarray that finds the specific genetic markers that distinguish one pathogen from another and also determine antibiotic resistance. The new technique permits searches for multiple diseases and antibiotic resistance in about a day, compared to the several days required by earlier methods. According to an announcement, “they can detect as many as 557 genes, making it possible for them to screen for 40 different species of bacteria, 1,200 serotypes of Salmonella, five common serotypes of E. coli, and resistance to the 45 most common antibiotics used to treat human and animal illnesses caused by these pathogens.” (September 2008) Ref.329

Chemical Tests on Cells Rather than Animals
The U.S. Environmental Protection Agency, the NIH Chemical Genomics Center, and the National Institute of Environmental Health Sciences have announced collaboration to change how chemicals are tested for risks they pose to humans. The agencies will research and implement a new approach that will move away from traditional animal testing and toward tests that use cells. The approach is explained in the National Research Council’s 2007 report Toxicity Testing in the 21st Century: A Vision and a Strategy. (February 2008) Ref.330

Nanotech-based Explosives Detector
Prof. Li Guang-tao of the Key Laboratory of Organic Optoelectronics & Molecular Engineering of the Ministry of Education at Tsinghua University, Beijing, and his group have developed nanocomposite silica films doped with porphyrins (nitrogen-containing macrocyclic molecules) which produce a very fast fluorescence response to trace vapors of explosives such as TNT, DNT
and NB (nitrobenzene). These films can be used as the basis for small, cheap, and fast environmental detectors. (December 2006) Ref. 331

**Detector Materials for Cyanogen Halides from Chemical Weapons**
Researchers at the Dept. of Chemistry at MIT, led by Samuel W. Thomas III, have developed new phosphorescent detecting compounds for cyanogen halides, used in chemical weapons. The new materials have greatly improved sensitivity to trace amounts of the toxins in the environment. (December 2006) Ref. 332

**New Spectroscopy Technique Speeds Up Virus Detection**
A nanotech-based diagnostic test that can detect viruses as diverse as influenza, HIV, and respiratory syncytial virus in a minute or less was developed by a veterinary research team at the University of Georgia. The technique referred to as surface enhanced Raman spectroscopy (SERS) measures the Raman frequency shift of a near-infrared laser as it scatters off viral DNA or RNA. The test has the advantage of detecting the viral DNA or RNA itself rather than the indirectly produced antibodies that are the basis of other viral testing. This provides a much more rapid and reliable evaluation of the threat. The basic method was well known but the signals produced were unusually weak. The breakthrough here was placing silver nanorods at an 86° angle on the specimen slides, an addition that enormously increased the strength of the returns. (November 2006) Ref. 333

**Nanofibrils Film Improves Explosives Sensing Performance**
A team of scientists from the University of Illinois and the Chinese Academy of Sciences developed a new fluorescent film, made from nanofibrils, which offers greatly improved performance in the detection of such explosive vapors as TNT. These sensors indicate the presence of explosives by losing their glow. They can be recycled repeatedly and also resist deterioration from exposure to sunlight. (June 2007) Ref. 334

**Bacterial Proteins Help Nanoparticle Cleanup**
A new discovery indicated that bacteria could excrete proteins causing metal nanoparticles to aggregate, making them easier to remove from the environment. Apparently the bacteria produce the proteins to protect themselves from potentially toxic nanoparticles. The team of researchers from the Lawrence Livermore National Laboratory, UC Berkeley, and the Lawrence Berkeley National Laboratory found the bacteria at the abandoned Piquette Mine, in southwestern Wisconsin. Peter Weber from the LLNL notes that the discovery indicates that cysteine or cysteine-rich polypeptides or proteins could potentially be used for nanoparticle clean up. “With the boom in nanoscience, people are naturally asking questions about the potential environmental impacts. Here, we see that naturally produced nanoparticles can be naturally controlled,” he commented. (June 2007) Ref. 335

**Fluorescent Sensor Bacteria Offer Fast Pollutant Detection**
Jan Van der Meer, an environmental microbiologist at the University of Lausanne, Switzerland, and his team have announced successful results in their testing of sensor bacteria that release an enzyme in response to a given chemical and that have been genetically engineered so that that release also produces a protein that fluoresces in a particular color. Trials were conducted by testing ocean water for pollution from a simulated oil spill. Results could be obtained in a matter
of minutes, as compared to the weeks needed for conventional chemical analysis. The bacteria’s self-reproduction eases the task of supplying test material. (September 2008) Ref. 336

**New Material Has High Absorbency for Organic Solvents**  
Researchers at Kyushu University in Fukuoka have developed a new material, which can absorb large amounts of organic solvents such as chloroform. The material can absorb 300-480 times its weight of various agents. (June 2007) Ref. 337

**New Production Technique for Nanofiber Filters for Chemical Warfare Protection**  
A new 3D honeycomb structure of polymer nanofibers, which, when incorporated into protective gear, would be much more efficient in adsorbing and possibly destroying dangerous chemical warfare agents in the environment was developed by scientists led by Dr. Seshadri Ramkumar, Asst. Prof. at the Institute of Environmental and Human Health at Texas Technology University. (October 2006) Ref. 338

**Sugar-coated Nanotubes Stop Anthrax Inhalation**  
Clemson University chemist Ya-Ping Sun and his team have developed a technique that uses sugarcoated carbon nanotubes to render weaponized anthrax harmless. Finely divided anthrax spores in the environment bind to the sugar coating, forming clusters too large to be inhaled, rendering the weapon useless. [See also *Sugar-Coated Gold Nanoparticles Detect Toxins* in April 2006 environmental security report] (October 2006) Ref. 339

**New Spectroscopy Sensor for Environmental Monitoring**  
University of Wyoming researchers have developed and patented a sensor that can be used with surface plasmon resonance (SPR) spectroscopy to produce a low-cost system for rapid detection of biological signatures, explosives, and other volatile chemical targets in the environment. The sensor element comprises a specially designed surface optically coupled to an SPR spectrometer. Molecules such as antibodies are held close to the SPR surface, with no intervening liquid/hydrogel layer, maximizing sensitivity. (September 2006) Ref. 340

**Nanocantilevers for Ultra-small Sensors**  
Researchers at Purdue University are investigating the use of nanocantilevers in designing a new class of ultra-small sensors for quick detection of viruses, bacteria and other contaminants in air and fluids by coating the cantilevers with proteins, including antibodies that attract the contaminants. Nanocantilevers vibrate at different frequencies when contaminants stick to them, revealing the presence of dangerous substances. The work is funded by the National Institutes of Health. (September 2006) Ref. 341

**Digital Magnetofluidics Improves Biochemical Analysis**  
A technique for more rapid, more accurate, and less costly analysis of biochemical fluids, such as is needed in biological warfare surveillance, was developed by the Department of Bioengineering of the University of Arizona in cooperation with other scientists. Based on magnetic forces, this form of "lab on a chip" minimizes contamination of the sample by the substrate, and saves both time and expensive chemicals. (August 2006) Ref. 342
Biosensors Sniff out TNT and Possibly Other Dangers

Temple University School of Medicine Fels Institute researcher Prof. Danny Dhanasekaran and colleagues have developed a new biosensor that uses a yeast strain genetically engineered with mammalian (rat) olfactory signaling machinery, linked to the expression of green fluorescent protein, to detect a chemical signature of TNT. The technique should be extendable to spot other chemical agents, such as sarin.

Biosensor 2200R, developed by Mine Safety Appliances Inc. of Pittsburgh, is a new biosensor able to determine the presence of a suspicious biological agent such as anthrax or ricin. The response time is less than 5 minutes (compared to about 45 minutes for the devices presently in use) and the unit has a very high accuracy, with only a one in a million chance of producing a false reading. (May 2007) Ref. 343

Reliable Anthrax Antibodies Developed

Swiss scientists have developed reliable anthrax-specific antibodies. This is an important achievement, since the similarity of the anthrax spore surface to that of spores of other bacteria, which commonly occur in humans, has previously prevented development of an antibody that would be reliably anthrax-specific for identification. (August 2006) Ref. 344

Bar-coded Nanowires May Yield Small, Fast Bio Detectors

A "nanowire bar-code" system developed by researchers at Lawrence Livermore National Laboratory in cooperation with several other institutions may facilitate creating portable sensors capable of identifying multiple airborne pathogens within minutes. The technique consists of coating a nanowire with a distinctive pattern of gold and silver stripes—alogous to a barcode—and then with an antibody for the target threat. The applications of such a system range from detection of biowarfare agents to use during an outbreak of an infectious disease. (August 2006) Ref.345

New Low-cost System for Bacteria Identification

Researchers at Purdue University's Bindley Science Center have developed a new low-cost high-speed system that analyzes scattered laser light to quickly identify bacteria. The technique uses computer analysis of 120 factors in laser light scattered by bacterial colonies growing in a petri dish, costs a tenth as much as conventional methods, and can be completed in five minutes after the culture has grown. (August 2006) Ref.346

Quantum Dot Device Provides Fast Detector for DNA Sequences

Researchers at Quantum Logic Devices, of Austin TX, have constructed a DNA sequence detector that can detect a piece of DNA in less than 30 minutes, compared to 24 hours for a fluorescence technique. (August 2006) Ref. 347

Sensicore’s Lab on a Chip Water Profiler Automates Lab Functions

This system applies chip technologies in a WaterPOINT device that dramatically shrinks the space and time required to perform sixteen standard water quality and treatment tests. Memory and software permit rapid comparisons and mapping of results for entire systems. The 0.4-millimeter pH electrode illustrates the degree of miniaturization achieved. Several wet chemistry procedures are reduced from hours to minutes in duration without the need for reagents. Additional testing capabilities are in development for promised availability in the near future.
Deep Cooling Improves Uranium Detection
Zheming Wang, at the Department of Energy's Pacific Northwest National Laboratory in Richland, Wash., has applied cryogenic fluorescence spectroscopy to detect uranium in contaminated soil at a former nuclear fuel manufacturing site. Use of an ultraviolet laser on the sample cooled to –267° C produced fluorescence intensity of more than five times that at room temperature, and brought out additional spectral features enabling different forms of uranium, including uranium carbonate, to be distinguished. (September 2006) Ref. 349

Biodetecting Wipes
Scientists at Cornell University have started development of an inexpensive and easy-to-use biodegradable absorbent wipe containing polymer nanofibers attached to antibodies for biohazards and chemicals. By changing color, or through another effect, the wipes signal when the antibodies bond to their targets. The 100 nm fibers provide very large surface areas for sensing, and increased absorbency compared to conventional fibers. (September 2006) Ref. 350

Fish Provide Early Warning of Toxic Chemicals
Bluegills, a small, hardy fish species, are highly sensitive to chemical disturbances in their environment, and react to toxins by convulsively flexing their gills to expel contaminating material. They can be used to monitor the chemical purity of a water supply by keeping them in a continuously re-supplied tank equipped with sensors to watch for changes in their breathing, heartbeat, and swimming patterns. The fish have successfully detected 30 alien chemicals, and have the advantage of requiring no "programming" for specific hazards. Their sensitivity was demonstrated on one occasion when they detected a diesel spill two hours before other sensors. The fish have been incorporated into an operational system by Intelligent Automation Corp. of Poway, CA. (September 2006) Ref. 351

Ultrasound Soil Cleanup Technique
Researchers at CSIRO Industrial Physics near Sydney, Australia have shown that high-intensity ultrasound can destroy toxic or carcinogenic persistent organic pollutants (POPs) that commonly contaminate land. According to New Scientist, "Cleaning them up is difficult. Incineration can produce toxic breakdown products, while chemical treatment methods can require huge amounts of energy or involve substances almost as toxic as those being cleaned up – risking dangerous leakages." The new technique, which avoids those problems, mixes the soil with water and then passes it through a chamber where the ultrasound produces localized temperatures of 4000° C and pressures of 1000 atmospheres, destroying up to 97% of the contaminants in a few minutes. (October 2006) Ref. 352

New Surface Decontamination Method
Bradley D. Veatch of Westminster, CO and associates have filed a patent application for a novel means of removing contamination, including radioactive material, from surfaces. An abrasive foam pad soaked in a mix of latex gel and conductive iodine solution is rubbed over the contaminated area, loosening any surface material and applying a layer of latex, while a high current is passed through it. An electrolytic reaction transfers the contaminant from the surface into the latex gel, and also polymerizes the gel, producing a strong rubbery skin, which can be
peeled off and safely discarded. (January 2007) Ref. 353

**Virus Detection Technique—Fast, Convenient, and Sensitive**
Aurel Ymeti and associated researchers at the Univ. of Twente, Enschede, the Netherlands, and elsewhere, have developed an improved new technique for virus detection and identification. As is the case with a number of other methods, it depends on the adhesion of the virus to an antibody-coated surface, but here the adhesion is detected optically, greatly improving the device's characteristics. A monochromatic laser beam is sent down a path which branches into two parallel channels and then rejoins. One of the channels is coated with the antibody; the beam in that channel undergoes a phase shift if the sample has attached to the antibody. When the beams from the channels are recombined, the phase shift produces a pattern of interference fringes if the virus was present. This detector is able to detect the herpes virus at just 850 particles per milliliter under physiological conditions (e.g. in human serum). (January 2007) Ref. 354

**New Technique for DNA Isolation**
TNO, in Delft, Netherlands, has developed a new tool, SamPrep, for the rapid automatic pre-treatment of biological material to separate out pure DNA for further analysis. The new automated system can produce results from a sample in 20 minutes instead of the hours required for manual manipulation. (January 2007) Ref. 355

**Sensitive Uranium Detector Using DNA**
Researchers at the University of Illinois and elsewhere, led by chemistry Professor Yi Lu, have developed a uranium sensor which they say "combines the high metal ion selectivity of catalytic DNA with the high sensitivity of fluorescence detection [and] provides a fast, on-site test for assessing uranium contamination in the environment and the effectiveness of remediation strategies". The sensor has a sensitivity of 11 parts per trillion. (February 2007) Ref. 356

**New and Improved Water Purification Method**
Delft University of Technology (Netherlands), with Merle de Kreuk as principal researcher, and the DHV engineering consultancy, has developed a compact and environmentally friendly water purification method, in which aerobic bacteria form granules that sink quickly. In this new aerobic granular sludge technology (Nereda™), aerobic bacterial granules are formed in the water that is to be purified. These granules not only sink quickly but their use also has the advantage that only one vessel is needed for the process. The new technique requires 25% of the space and 70% of the energy needed for earlier methods. (July 2006) Ref. 357

**Microbes Can Help Build Nanodevices for Detection**
University of Wisconsin scientists have electrically stimulated bacteria to self-assemble into nano-bio-electrical circuits that could detect toxins like anthrax in near real-time. These circuits have the potential to make building atomic-scale machines far easier than current methods, and create a new class of biological sensors. This ability to a) manipulate individual bacteria by electrical means, b) form them into nanostructures, and c) use their biochemical properties for useful applications, such as the detection of toxins, provides an alternative to the painstaking manufacture and assembly of nano systems by larger more costly systems. Nanotechnology self-
assembly to create larger devices (bottom up construction) has been seen as a more distant future possibility. This breakthrough brings low-cost, precision mass production a step closer to reality. (March 2005) Ref. 358

**High Sensitivity Portable Chemical Detection Device**

A research team led by R. Graham Cooks at Purdue University has developed a mass spectrometer for chemical detection and identification that has the twin advantages of high sensitivity \(10^{-12} \text{ g}\) and portability/speed (no pre-treatment needed). The equipment uses desorption electrospray ionization (DESI), a technique that separates traces of material from a substrate so that they can be passed into the analytical instrument. The device has analyzed pharmaceuticals at three samples per second. (October 2005) Ref. 359

**Piggybacking Environmental Sensors on Communications Gear**

Computer science graduate student R.J. Honicky and Prof. Richard Newton of the Univ. of California at Berkeley are working on inexpensive environmental sensors that can be incorporated into communications devices like cell phones, using the power, location (e.g. GPS), and communications facilities already present in those devices. This technique would greatly reduce the space and cost burden of providing environmental data coverage over a wide area. (August 2005) Ref. 360

**Very Low Cost Chemical Sensors for Environmental Monitoring**

Electrical engineering Prof. Vivek Subramanian at the University of California, Berkeley, has developed a technique for inexpensively producing arrays of chemical sensors, using organic semiconductors and ink-jet printing. Based on organic transistors, the array of sensors mimics the behavior of the human nose, differentiating among toxins in air or water. This approach would cut the cost of such sensors from several hundred dollars per unit to about 30¢. As a result, more nearly ubiquitous toxin monitoring will be possible. (December 2005) Ref. 361

**Nanobarcodes for Multiple Pathogen Detection**

Scientists in the Department of Biological and Environmental Engineering at Cornell University have developed a rapid, low cost, multiplexed, sensitive and specific molecular detection technique for pathogen DNA that uses fluorescence nanobarcodes to identify the individual potential reactants. A single element in the system comprises a section sensitive to the DNA of a particular target and one containing a bar code identifying it. Multiple elements can be placed on a single test probe. Results can be obtained in 30 minutes. (July 2005) Ref. 362

**Bacteria Used to Eliminate Perchlorate from Water**

Perchlorate, an ingredient of rocket fuel and fireworks, and known to be dangerous to human health, has become present in drinking water in many parts of the world. Bruce Rittmann of the Center for Environmental Biotechnology at Arizona State University, Tempe, has discovered an efficient way to remove the chemical, by using a system of bacteria that feeds on hydrogen gas and perchlorate to produce water and chloride—a compound commonly found in salts and swimming pools. The advantage of this system over others for the same purpose is that it’s very cost-effective and it doesn’t appear to generate harmful waste by-products. The bacteria are grown on membranes that are wrapped into spaghetti-like strands that can be filled with
hydrogen and bundled into cylinders through which flows the contaminated water. A 1.5-meter-tall system with 7,000 fibers can clean 4-8 liters a minute, says the researcher. The system was already tested on ground water from California's central valley, and in about 2 years its efficiency could be boosted enough to clean the waste water of a small city. [See also Firm Regulations for Perchlorates are Needed in October 2004, and Technology for Perchlorates Cleanup of August 2004 environmental security reports.] (September 2005) Ref. 363

**New Oil Remediation and Recovery Technique**
A proprietary oil remediation and recovery application, using patented Self-Assembled Monolayer (SAMs) technology, has been announced by Interface Science Corp. Its treated material, produced using nanoscale techniques, absorbs about 40 times its weight in oil, and has the added advantage of allowing the absorbed oil to be recovered. (September 2005) Ref. 364

**New Efficient Energy-free Technique for Oil Removal from Water**
The Extended Gravity Oil Water Separation (EGOWS) concept developed by an engineering team from the University of New South Wales is an improvement on the industry-standard American Petroleum Institute (API) gravity separator that has been widely used for the last 60 years. The device is a simple tank-and-siphon system, entirely mechanical, that operates unattended and purifies water to oil content less than 10 ppm, the level often set by environmental regulations. A simple, innovative application of hydraulic principles results in residence times of days instead of minutes, as is common with API designs. Utility seems be limited to sources with episodic discharges, rather than steady flows. (August 2005) Ref. 365

**DNA-Wrapped Nanotube Sensors**
Trace amounts of harmful contaminants can be found inside the body via single-walled carbon nanotubes wrapped with DNA and placed inside living cells. Ions of atoms such as calcium, mercury and sodium in contact with DNA neutralize its negative charges, changing its shape. This reduces the frequency of the nanotube's fluorescence indicating how many ions have bound to the DNA. "We found that the thermodynamics that drive the switching back and forth between these two forms of DNA structure would modulate the electronic structure and optical emission of the carbon nanotube," said Michael Strano, a professor of chemical and biomolecular engineering at the University of Illinois at Urbana-Champaign. (January 2006) Ref. 366

**Sugar-Coated Gold Nanoparticles Detect Toxins**
Researchers at the UK's University of East Anglia have developed a new method for detecting toxins based on the use of 16-nm-sized sugar-coated particles of gold. The sugars used are tailored to be sensitive to specific substances; a solution containing the particles will change color in the presence of the target material. The scientists speculate that a portable detector using this scheme could be ready in five years. (April 2006) Ref. 367

**Fast Bacteria Detection from Bacteriophage/Quantum Dot Complexes**
Scientists from the National Cancer Institute (NCI) and National Institute of Standards and Technology (NIST) have developed a technique for the fast and sensitive identification of bacteria. A selected type of bacteriophage attacks a specific bacterium and produces phage particles that bind to specially treated quantum dots (nanoscale semiconductor particles that give off stronger and more intense signals than conventional fluorescent tags). Fluorescence of the
phage-dot complexes can be detected by conventional microscopy or other means. The method can use several different types of complexes simultaneously and can detect and identify up to ten target bacterial cells per milliliter of sample in about an hour. (April 2006) Ref. 368

**Anti-anthrax Protein Found**

A lysin (specialized enzyme protein) that selectively destroys the anthrax bacterium has been identified by Vincent Fischetti, professor and co-head of the Laboratory of Bacterial Pathogenesis and Immunology at Rockefeller University. The new protein, PlyPH, which is found in a bacteriophage, has the advantage of working over a wide range of pH values and also of killing only anthrax and not any other possibly beneficial organisms. The researchers hope to combine PlyPH with another compound that causes anthrax spores to germinate, and thus become vulnerable to destruction. (April 2006) Ref. 369

**New Microcantilever for Biochemical Detection**

Researchers at the Nanomaterials for Cancer Diagnostics and Therapeutics Center for Cancer Nanotechnology Excellence at Northwestern University have developed a new device that generates a direct electrical signal from the bending that occurs when a suspect biological molecule bends a cantilever in binding to an antibody or complementary nucleic acid sequence attached to it. The cantilever's motion has been detected optically in previous devices, but here the tiny beam forms part of a MOSFET semiconductor, and causes a sharp change in current when displaced. The device can be mass-produced using standard computer chip design and manufacturing techniques, and can detect bending of as little as 5 nm when triggered by DNA or antigens. (March 2006) Ref. 370

**Chopped-up DNA Strands Speed Bacterial Identification**

A team of researchers at the Brookhaven National Laboratory has developed a new technique for rapid and efficient identification of pathogenic bacteria within an unknown mixture of microbes. An enzyme is added to the mixture that chops up the bacterial DNA into short segments, which can be individually isolated and identified, thus enabling the detection of harmful organisms in the environment. This is much faster than preparing bacterial cultures and avoids the possibility of favoring the detection of certain bacteria over others. (March 2006) Ref. 371

**New Spectroscopy Technique with Superior Results**

Scientists at JILA (originally the Joint Institute for Laboratory Astrophysics, but presently having no definition), the institute jointly sponsored by the National Institute of Standards and Technology and the Univ. of Colorado – Boulder, have developed a new technique for spectroscopy as used in the identification of minute quantities of chemicals in gas samples, such as in environmental monitoring stations, or screening for explosives or biochemical weapons. The JILA system uses an ultrafast laser-based "optical frequency comb" as both the infrared source and as a means for precisely measuring the wavelengths produced after interactions. Its sensitivity of one part in $10^8$, and an acquisition time of 7 ms for its 100 nm wavelength range indicate its increased capability for use in systems for monitoring the environment. (March 2006) Ref. 372

**Laser-tracked Honeybees Detect Landmines**

Joseph A. Shaw at Montana State University and colleagues have developed an improved
landmine detection system which first trained honeybees to sniff out explosive fumes leaking from buried landmines, and then tracks them with polarized laser scanning beams. The accuracy is better than 97% at a distance of 83 m, and there is no danger of setting off the landmines. (August 2005) Ref. 373

**Real-Time Antibody-based Bioterrorism Detection System**
A major weakness in most bioterrorism detection technologies is the time lag between sample collection and laboratory verification of the presence of target pathogens. Scientists at the United Kingdom’s Defence Science and Technology Laboratory at Porton Down have developed biological sensors based on antibodies. Being based on antibodies, these sensors can detect a bioterrorist attack in real-time, and can distinguish among different pathogens. Since this and other systems being developed by other countries will be important to “scale up” for all countries, international standards and agreements for their deployment and monitoring seem inevitable. (April 2004) Ref. 374

**Russian Discovery of New Bacterial Cleanup Technique**
Scientists from the G.K. Skryabin Institute of Biochemistry and Physiology of Microorganisms of the Russian Academy of Sciences in Pushchino have discovered that the bacterium *Pseudomonas putida* can transform the toxic by-products contained in reaction masses (RMs) that arise when mustard gas residue is destroyed by chemical detoxification. This technology, if extended to other hazardous materials and brought to the point of practical application, could be an alternative to incineration or a process called bituminization for the final cleanup of CW sites. Both those methods are expensive and environmentally risky. (March 2005) Ref. 375

**A Radioactive Element’s Rate of Decay Has Been Speeded Up**
Japanese scientists from Tohoku University in Sendai have decreased the half-life of beryllium-7 by about half a day, which represents almost 1%, the most dramatic result obtained so far. While this is a promising success, researchers admit that the possibility of significantly speeding up the process remains "somewhat remote". However, Peter Möller, from the Los Alamos National Laboratory in New Mexico, says that re-creating conditions such as those found in the interior of a hot star (which we don’t know yet), might considerably enhance the effect that the Japanese scientists have obtained. (September 2004) Ref. 376

**Nanoshells Dramatically Improve Sensing Capability**
Research at Rice University's Nanophotonics Laboratory has shown that a class of nanoparticles known as nanoshells can enhance the sensitivity of chemical sensing by a factor as high as 10 billion. This is accomplished by using them to produce "surface enhancement" in Raman scattering, an optical technique for chemical analysis. The nanoshells are a few hundreds of nanometers in diameter and consist of a glass sphere coated with a layer, typically gold or silver, whose thickness can be varied to "tune" the shell to a specific optical wavelength. According to Prof. Naomi Halas, the Laboratory Director, this "creates an opportunity to design all-optical nanoscale sensors—essentially new molecular-level diagnostic instruments—that could detect as little as a few molecules of a target substance, which could be anything from a drug molecule or a key disease protein to a deadly chemical agent." (January 2005) Ref. 377
Iron Nanoparticles for Environmental Cleanup
A new study from Oregon Health & Science University's OGI School of Science & Engineering, in collaboration with Pacific Northwest National Laboratory (PNL) and the University of Minnesota, shows that some iron nanoparticles may be effective in cleaning up carbon tetrachloride in contaminated groundwater. The researchers studied two types of iron nanoparticles, one with a shell of sulfur-rich magnetite and the other with a coating of oxidized boron. When applied to carbon tetrachloride contamination, the former produced a mix of harmless chemicals while the latter yielded chloroform, a highly toxic material. These fundamental results should aid greatly in the development of nano-iron-based cleanup methods for contaminated sediments and soil as well as for groundwater, and for their application to a range of more complex organic pollutants. (January 2005) Ref. 378

Dirty Bomb Clean-Up Technology for Porous Structures
New technology to safely capture and dispose of radioactive elements from outdoor porous structures (brick and concrete) is being developed by Argonne Laboratory's Chemical Engineering Division in Illinois. The new decontamination system is based on engineered nanoparticles and a super-absorbent gel. It is expected to be available in 18 months. (July 2004) Ref. 379

New and Improved Land Mine Destruction Technique
A British de-mining specialist corporation, Disarmco, in partnership with ordnance and explosive experts at Cranfield University at Shrivenham, have developed a new environmentally friendly and low-cost mine destruction device, codenamed "Dragon". The device is based on a high-temperature pyrotechnic torch, which burns the explosive material in the mine rather than detonating it, a technique that can cause destruction and contamination over a substantial area. According to the university, "The torches are made in situ in … [a] portable unit and do not require any specialist knowledge or expensive training in order to be used safely by local communities employed in decontamination efforts." (April 2005) Ref. 380

Bionanotech Particles Can Detect Bacteria in 20 Minutes
A team of researchers at the University of Florida created a bioconjugated nanoparticle that can detect single pathogenic bacteria in just 20 minutes. Although demonstrated just for E. coli, researchers say that by changing the antibodies employed, the ultrasensitive particles can be modified to detect a wide variety of bacteria. The team continues to work for enlarging the technique’s scope by creating bioconjugated nanoparticles to detect multiple bacteria simultaneously. The new technique is a promising method for detecting bioagents in food and clinical and environmental samples, and for early medical diagnosis. It could also prove important for assisting the enforcement of current and future international treaties that address organic transfers across national borders. (October 2004) Ref. 381

Chemical Probe Offers Fast Detection of Ricin
A team of the Dept. of Chemistry and Biochemistry at the University of California at San Diego developed a fast-acting (30 minute) test for the presence of ricin-caused cell damage, based on inserting into RNA a synthetic nucleoside that glows under UV, when it is damaged by ricin. Previous tests, which detect the ricin protein itself, require 48 hours. The researchers anticipate that the technique can be implemented in a chip for use in the field. (July-August 2008) Ref. 382
Nanodevices for Biomolecules Detection
Two U.S. research teams designed nano-devices for virus detection. The nanoelectromechanical device by Cornell University can detect an insect baculovirus, while the nanowire field effect transistors developed by Harvard University can detect single influenza viruses. These techniques enlarge the capability to detect different viruses simultaneously.
Argonne National Laboratory scientists developed a magnetic sensor for bacteria and virus detection. The device relies on measuring the Brownian relaxation of magnetic nanoparticles when they are bound to target biomolecules. The team is now working to improve the sensitivity of the technique. All three methods could be used in medicine and/or the detection of bacteria and viruses in the environment. (October 2004) Ref. 383

Nanotubes that Detect and Kill Biological Agents
With funding from the U.S. Department of Defense's Army Research Office, University of Pittsburgh researchers have found a technology for developing nanotube structures that act both as biosensor and biocide. The objective is to produce a paint that would change color in contact with biological and/or chemical agents and also neutralize the toxic substances. The antimicrobial nanotube structures are the product of a single-step synthesis of a hydrocarbon and a salt compound (quaternary ammonium). (September 2004) Ref. 384

Nano-engineered Powders Tackle Toxic Chemicals
FAST-ACT is a new family of nano-engineered powders that can clean up hazardous substances such as VX nerve gas and sulfuric acid. This toxic-chemical cleaner composed of magnesium, titanium, and oxygen was developed by Kansas State University chemist Kenneth Klabunde and will be produced by NanoScale Materials Inc. (May 2005) Ref. 385

Smart Dust could be used to monitor and/or detect hazardous chemical or biological agents in the water and air
Smart dust has been in development for the last decade, with the intent of providing a cheap, lightweight, lingering, swarm-based technology that could provide multi-spectral intelligence over critical battlefield and post-conflict areas inaccessible or too hostile for other reconnaissance technologies. The University of California, San Diego (UCSD) has developed a smart dust application for optically alerting the presence of oil in water. "Such devices could be used to monitor the purity of drinking or sea water, to detect hazardous chemical or biological agents in the air or even to locate and destroy tumor cells in the body" said Michael Sailor, a professor at UCSD's department of chemistry and biochemistry who led the study. (August-September 2003) Ref.386

Bacterial Integrated Circuits
University of Tennessee scientists have developed a device to collect signals from specially altered bacteria. These Bioluminescent Bioreporter Integrated Circuits (BBICs) have already been used for environmental monitoring. (June 2004) Ref. 387

Military Applications of Silicon-Based Ultraviolet Sensors
A photodetector sensitive to ultraviolet light was produced by researchers at the University of Illinois at Urbana-Champaign. They used standard lithographic techniques to deposit thin films
of silicon nanoparticles on silicon substrates with small conductive pads of gold to complete the assembly. Electricity flows when ultraviolet light strikes the nanoparticles. In addition to commercial applications, the silicon-based ultraviolet sensors could have military and security functions as ultraviolet-based detectors for missile-warning systems and airborne biological agents. They could also be useful in detection of violations of future environmental treaties; and hence might be considered in the implementation section of future treaties. (July 2004) Ref. 388

**Technology for Perchlorates Cleanup**
Sub-Surface Waste Management (SSWM) of Delaware has developed a technology for rapid cleanup of perchlorates from soil and groundwater. The new technology is based on a special blend of microbes and nutrients that can degrade perchlorates in soils within approximately a week of initial inoculation. (August 2004) Ref. 389

**Motion Detector Allows Naked Eye to See Motion of 10 Nanometers**
Sandia National Laboratories have developed a motion detector 1,000 times more sensitive than any known so far. It has the ability to sense a motion of 10 nanometers with the naked eye. The device is based on a formerly unrecognized property of optics: light diffracted from very small gratings that move very small lateral distances undergoes a relatively big, and thus easily measurable, change in reflection. That change can be amplified for human visibility, or it can be fed to additional instruments for a variety of measurement and automated control and analysis functions. Such high sensitivity detectors would have extensive applications from improving earlier warnings of earthquakes to detecting future nanotech weapons and surveillance equipment. (October 2004) Ref. 390

**Designer Bacteria Could Help Cleanup Pollution and Produce Hydrogen**
Craig Venter (who led the Human Genome Project) and his colleague Hamilton Smith are trying to construct the entire genomes of living creatures to create organisms by design. The team first created a virus from its chemical elements in November 2003 and now is trying to create bacteria. The Department of Energy’s “Genomes to Life” program coordinates the research and hopes to use future “designer” bacteria to create hydrogen and methane, and clean up nuclear waste. Although it is already known how to use bacteria for some forms of environmental cleanup, building bacteria from scratch would allow the design of very specific bacteria for very specific tasks, including prevention of the designer bacterium's ability to reproduce in the environment beyond the original intended purpose. (December 2004) Ref. 391

**New More Efficient Microbial Fuel Cell Cleans Wastewater and produces Hydrogen**
The BioElectrochemically-Assisted Microbial Reactor (BEAMR) is an anaerobic, electrically-assisted microbial fuel cell (MFC). It produces four times the amount of hydrogen from dissolved organic matter such as human, agricultural, and industrial waste and simultaneously cleans the wastewater used as its feedstock than bacteria achieve in normal fermentation. It uses 0.25 volts of electrical boost, about one-tenth the voltage needed for electrolysis of water, which helps it surmount the fermentation energy barrier limit. This form of decentralized renewable energy production could make fuel-cell-based transportation and wastewater treatment more efficient, but further study will be needed for commercialization. The National Science Foundation and U.S. Dept. of Agriculture supported this Pennsylvania State University research. (April 2005) Ref. 392
Sunlight-powered System for Cleaning Water and Produce Electricity
Scientists from Aberdeen University of Scotland began a three-year research project for developing a “photoelectrocatalytic” fuel cell that would harness sunlight to break down various organic pollutants in water and produce electricity as a byproduct. (May 2005) Ref. 393

Proposed T-Rays (TeraHertz) Devices Could Detect Almost Anything
New devices that use terahertz rays (T-rays have a 1000 times higher frequency than microwaves) to see through clothing and packaging can precisely identify chemical and biological weapons, explosives, or conventional weapons. Even hermetically sealed anthrax and plastic guns would be detected. The potential applications of T-rays are huge, ranging from military and security, to the medical sector, and are even promising for nanotechnology. Research is preliminary, but T-ray palm devices might one day detect cancers in the body, determine from a distance the chemicals in a hazardous waste spill, or find victims trapped under rubble, says one of the researchers, Dr. James Kolodzey, of the University of Delaware. Scientists from America, Europe, Asia and Australia shared the latest advances in T-ray technology at the international workshop on TeraHertz for Defence and Security, at Adelaide University, Australia. (December 2004) Ref. 394

Automated Water Safety Sensor Units
Sandia National Laboratory teamed with CH2M Hill of Englewood, Colo., an engineering and construction firm, and Tenix Investments (Australia's largest defense and technology contractor) to develop a monitoring device that can detect currently unmonitored biological agents—such as germs, toxins and bacteria—in water systems. Initial commercial units and wider deployment are anticipated from late 2005 to mid 2007. (December 2004) Ref. 395

Arsenic-polluted Water Decontamination Using Sulphate
Detecting and detoxifying water contaminated with arsenic could become faster, easier, and cheaper according to recent research by the University of Illinois. Tests so far demonstrate that changing the chemical composition of water, by adding sulphate to it, could stimulate the bacteria that control arsenic concentration, precipitating arsenic, which is then easily removable from the water. The research remains to be tested in the field. (November 2004) Ref. 396

Water Nanofilters
Carbon nanotube water filters might replace traditional filtration systems, which are difficult to clean and must be changed frequently. The new technology, developed by a team of researchers from Rensselaer Polytechnic Institute in Troy, NY, and the Banaras Hindu University in Varanasi, India, consists of a quartz tube filled with tightly packed radially oriented nanotubes. The water molecules can squeeze out through nanometer-sized gaps in the walls, but bacteria like E. coli and viruses like the 25-nanometer-wide poliovirus get stuck. The resistant structures can be cleaned repeatedly. (October 2004) Ref. 397

Sandia National Laboratories funded to develop improved Desalination and Arsenic Removal Technology
Sandia will conduct a $6 million research program to develop techniques for desalination ($3 million) to increase the supply of drinking water and removal of arsenic ($3 million) from water
The Millennium Project

Low-cost, Non-polluting Sewage Treatment System
Nothing escapes into the ground or water supplies from BIPU (bio-remedial in field personnel unit), a low-cost, non-polluting, flush toilet sewerage system. It holds solids in a special plastic chamber where they break down, while the liquid content is removed and evaporates in an elevated absorption system. The system is produced by Tasmanian Environmental Solutions at George Town, Tasmania. It has been used in Tasmania for several years, and the UN used 150 BIPU systems during the East Timor peacekeeping operations. (October 2004) Ref. 399

New diamond film connects electronics and biology for on-going bio-alert systems
Chemists at the University of Wisconsin – Madison have developed a technique for chemically modifying diamond so that it can be deposited on silicon as a highly stable, DNA-modified surface film. This film, which can be integrated with microelectronic devices, has the advantage of being much more chemically stable than other substances, such as gold, glass, and glassy carbon, which have been considered for detectors. “Bare” silicon oxide degrades on contact with water, and other materials have proven to be either unstable or difficult to integrate. Scientists are quoted as saying that they can detect the electrical response when biomolecules bind to the diamond surface. These biosensors could be "sprinkled in public places such as airports, bus depots, subways, stadiums and other places where large numbers of people gather." One scientist says they could act as a "bio cell phone, where they just sit in place and sniff, and when they detect something of interest, send a signal" to warn of danger. They also note that more work has to be done on the engineering of systems using these components. The technique may also turn out to be capable of producing reusable “biochips” for laboratory use. (March 2003) Ref.: 400

New chip speeds field detection of specific DNAs
Technological change creates opportunities to change international treaties’ enforcement requirements. For example, a new chip could make it possible to do faster DNA analysis of biological materials in the field. Scientists Todd Krauss, Benjamin Miller, and Hui Du at the Unv. of Rochester have developed a technique for creating microchips which will detect the presence of specific DNA sequences in a sample. The new chips eliminate the complex series of steps now necessary to perform DNA testing. They contain a field of bent DNA fragments attached vertically at one end to a substrate. When a piece of DNA from the sample attaches to a matching fragment, it straightens it out, exposing the previously concealed free end, which contains a chemical “flag” that fluoresces under proper illumination. (February 2003) Ref.: 401

On-chip antenna to solve communication problems among microscopic sensors
University of Florida electrical engineers have installed a radio antenna less than one-tenth of an inch long on a computer chip and demonstrated that it can send and receive signals across a span of several feet. By covering a large area with a number of such radio chips, each powerful enough to transmit information to the next radio, one can create a single large network that could be monitored from a distance. (May 2004) Ref.402

Miniature spectrometer can detect biological hazards
The Oak Ridge National Laboratory has developed a miniature device that can identify
molecules in a fraction of a spore of anthrax and other biological hazards within 30 milliseconds by examining their photothermal signatures. The process uses thermal detection to identify peaks in the specimen’s absorption spectral response produced using an infrared monochromator. The Calorimetric Spectrometer (CalSpec™) device technology can accurately identify biological hazards such as anthrax almost instantly, and may be able to reach sensitivities as high as one part per trillion (enabling the “fraction of a spore” level). The device is expected to be available in 2004. It is now hand-held; miniaturization efforts are underway to reduce it to coin-size. (March 2003) Ref.:403

Detecting chemical threats with "intelligent" networks
A new system based on microsensor arrays connected to artificial neural networks has the potential to provide early warning of chemical warfare agents well before concentration levels become lethal. The Prototype, presented by National Institute of Standards and Technology (NIST) scientists and a guest researcher at the annual meeting of the American Chemical Society, has the potential to detect compounds such as sulfur-mustard gas and nerve agents (tabun and sarin) at levels below 1 part per million and predict their concentration in the ambient air. The research, funded by NIST and the Defense Threat Reduction Agency, continues. (August-September 2003) Ref.404

Invention of a new multisensor system required to speed up landmine clearance
RAND estimates that unless considerably improved detection and demining technology is created, then at the current rate it will take 450-500 years to clean up the world of hidden anti-personnel mines. Its study "Alternatives for Landmine Detection" estimates it will cost $60 million to produce the initial prototype over the next 5-8 years to develop the necessary technology, beyond the $100 million per year the US already spends on humanitarian landmine clearance. (February 2003) Ref.: 405, 406, 407

Hand-Held Chemical Analysis and Detection System can identify the presence of some hazardous chemical or biological agents
Sandia National Laboratories has developed and tested a series of hand-held chemical analysis and detection systems that can identify the presence of hazardous chemical or biological agents: biotoxins, viruses, and bacterial agents; chemical warfare agents and a selection of toxic industrial chemicals, explosives, and organic solvents. Developed mainly for homeland security, Sandia seeks commercial partners to further develop the technology and make it available on the market to other organizations concerned of environmental quality and control. (October 2003) Ref.408

Muon Technology can help detect smuggled nuclear material
Los Alamos National Laboratory research indicates that fragments of cosmic rays could help in the detection of smuggled nuclear materials. Dense materials such as uranium can be detected and imaged by tracking the paths of muons as they pass through the target materials. Muons are created naturally when cosmic rays from space interact with the Earth's atmosphere, and pass through the Earth's surface at a rate of approximately 10,000 particles per square meter per minute. The concept offers a promising addition to conventional X-ray, gamma and neutron-detection systems.
"We found that we could detect a 1-liter block of uranium in the equivalent of a truckload of sheep, for example, and the greater the efforts at shielding the material, the more obvious it becomes with the nuon technology" said Priedhorsky, chief scientist of the Laboratory's Nonproliferation and International Security Division. For example, a 1-minute shower of particles would be required to reasonably scan a suspected smuggler's vehicle. (March 2003) Ref.: 409

**Molecular pattern matcher for chemical detection**
A new paper describes an improved technique for fast, portable, accurate, and flexible quantitative detection of organic molecules such as those which are degradation products of nerve agents. In the reported test, molecules of methylphosphonic acid (MPA) were embedded in an organosilane layer, and then washed away, leaving behind an imprint which, when later filled with another MPA molecule, produced a detectable electrical signal. (May 2004) Ref. 410

**New Production Process for Gold Nanoparticles Make Biosensors Less Costly**
Mass availability of low cost biological sensors may be available sooner than previously thought. A new process has been demonstrated that allows bullion quality gold nanoparticles to be deposited on silicon from relatively low quality gold sources. Organic molecules can then be deposited on the gold surface of the computer chip. Since gold does not corrode in air, it is the best computer-biology connection. This connection is what can link computer systems for improved biological surveillance. (December 2002) Ref.: 411

**Nanoscale Iron Particles as an environmental cleanup technology by reducing toxic chemical and heavy metals into less toxic compounds**
A National Science Foundation sponsored study has found that nanoscale (1 to 100 nanometers in diameter) powdered iron is an effective environmental cleanup tool. Nanoscale iron breaks down chlorinated organics into less toxic organic compounds and electrochemically reduces heavy metals to a less soluble form, which reduces their migration through groundwater. Since nanoscale iron can be suspended in a slurry and pumped into contaminated areas, no pump-and-treat or earth moving approaches are needed for remediation of contaminated soil and groundwater. (August-September 2003)Ref. 412

**Nanoporous Ceramic uses for heavy metals cleanup**
A nanoporous ceramic developed by researchers at Pacific Northwest National Laboratory, US, can be used to remove mercury from water, having as an immediate application treating wastewater from coal-fired power stations. However, researchers say that the thiol-SAMMS material could also remove mercury from water streams resulting from the vitrification of radioactive wastes, battery manufacturing, fluorescent lamp recycling and dental preparations. Also, the technology could be adapted to target other substances such as lead, chromium or radionuclides instead of mercury. (May 2004) Ref.413

**Nanotubes could be used to detect nerve gas and other chemical warfare agents, and toxic chemicals**
Naval Research Laboratory researchers developed nanotube-based sensors from random networks of single-walled carbon nanotubes that could detect sub-parts-per-billion concentrations of nerve agents, other chemical warfare agents, and other toxic chemicals.
Nanotube network sensors combined with filters coated with polymers that are sensitive to certain chemicals could make sensors that detect specific chemicals. Arrays of sensors could be incorporated into handheld or remotely operated devices designed to detect a variety of substances. According to the researchers, carbon nanotube sensors could become available within two to five years. The U.S. Department of Homeland Security’s Research & Technology Division is currently accepting proposals to develop such capacities for the civilian population, while previous military research has focused on protection of military personnel.

Meanwhile, at the Harvard Biosecurity 2003 conference, government officials were more skeptical, offering the opinion that fast, inexpensive, reliable devices for detecting biological agents are still at least six years in the future. (November 2003) Ref.414

**Bacterial Conversion of soluble uranium to insoluble uraninite might eventually be used to clean heavily contaminated sites**

The University of Massachusetts Amherst has enabled Geobacter bacteria to convert soluble uranium to insoluble uraninite. A recent test showed that after 50 days, in the presence of artificially elevated levels of acetate, 70% of soluble uranium had been converted into uraninite. (October 2003) Ref.415

**Artificial organisms and/or genetically engineered living bacteria used in cleanup operations**

Craig Venter, who sped up genomic research, is now trying to speed up the creation of a partly artificial life form, by creating an artificial chromosome. It would be a first step towards his eventual goal of creating an artificial organism from scratch. The objective is to try to make microbes that can clean the air of excess carbon dioxide or to produce cheap hydrogen fuel. This is a different approach than to genetically engineer living bacteria to do dirty work, such as absorbing radiation or toxic chemicals, which consists of inserting genes from one species into another. (November 2002) Ref.:416

**Microbes as part of post-battle field clean up**

If we are able to create microbes that clean up a variety of environmental damages, then such microbes could be required in future post-battle field cleanup treaties. In theory we could alter microbial DNA to do almost anything conceivable including restoring training and battlefield environments. “Scientists have long looked at extremophiles—bacteria that live in hotter, colder, more toxic, and more radioactive environments than we do—as sources for tools.” (August 2002) Ref.:417

**Pollution-eating microbe may help clean up**

A Michigan State University study has discovered a microbe (called TCA1), which derives energy by breaking down trichloroethane into a less-toxic substance. Trichloroethane contaminates ground water and also erodes the ozone layer when released into the atmosphere. This is another discovery of bacteria that consume toxins, suggesting a strategy for bioremediation of the environment. (November 2002) Ref.:418

**Real-time antibody-based bioterrorism detection system**

A major weakness in most bioterrorism detection technologies is the time lag between sample collection and laboratory verification of the presence of target pathogens. Scientists at the United
Kingdom’s Defence Science and Technology Laboratory at Porton Down have developed biological sensors based on antibodies. Being based on antibodies, these sensors can detect a bioterrorist attack in real-time, and can distinguish among different pathogens. Since this and other systems being developed by other countries will be important to “scale up” for all countries, international standards and agreements for their deployment and monitoring seem inevitable. (April 2004) Ref.419

Manure Aids in Removing Hydrogen Sulfide from Biogas
SulfaMaster is a product combining manure and other ingredients to produce a filtering material that removes hydrogen sulfide, an acid rain- and corrosion-causing component, from biogas, a renewable energy source derived from the breakdown of animal waste. It is especially suitable for small biogas-producing operations that cannot afford large scrubbers. The developers are Gary Harman, professor of plant biology at the New York State Agricultural Experiment Station in Geneva, and Terry Spittler, a retired analytical chemist at Cornell. (January 2009) Ref. 420

Transgenic plants to decontaminate the environment
Researchers at the University of Georgia have announced the successful development of a transgenic plant, a member of the mustard family, which removes arsenic from contaminated soil and concentrates it in its leaves, to be harvested and safely destroyed. Two arsenic-protective Escherichia coli (E. coli) genes were transferred into thale cress, which then flourished in a normally poisonous arsenic-rich soil, and concentrated two to three times as much arsenic as wild specimens. Although this particular approach applies only to the absorption of arsenic, it is possible that similar transgenic methods could be developed, to produce phytoremediants for chemicals that are more likely than arsenic to be battlefield contaminant. If so, these could find their way into international agreements on post-conflict environmental agreements. (October 2002) Ref.:421

Aquatic Plant Removes POPs from Wetlands
Scientists at the Georgia Institute of Technology have discovered that duckweed, a common floating aquatic plant, can remove persistent organic pollutants (POPs) from wetlands, particularly chlorinated, fluorinated and mixed chloro-fluoro compounds. It remains to be determined how to dispose of the plants after they absorb and store the compounds. (August 2004) Ref. 422

Bacteria-modified Yellow Lupine to Remove Toluene from Soil
A bacteria-modified yellow lupine seems to be very effective in removing toluene from soil. The scientists who have created it say that depending on the type of bacteria utilized, the approach can be used to develop different varieties for cleaning up other chemical pollutants. [See also the related item on a transgenic plant—a member of the mustard family—which removes arsenic from contaminated soil.] (April 2004) Ref.423

Implementation steps for Landmine Control Convention: new genetically modified plant to detect landmine explosive
Researchers at the University of Alberta, Canada, will receive support over the next two years from the Department of National Defence's Canadian Centre for Mine Action Technologies to
work on genetically modifying a plant, related to canola, by inserting a TNT-sensitive gene into its DNA. After its seed is planted in suspected minefields and the plants' roots come into contact with TNT, their leaves or flowers will change color, alerting people to the presence of landmines. The project is one small part of a larger joint U.S.-Canadian military threat detection effort called Project BIOS, or biological input-output systems, funded in the United States by DOD.

Anthony Faust, of the Defense Department's landmine detection, who came up with the idea of landmine-detecting plants, said that while the Canadian project deals with landmine detection, the American project deals with biological systems as chemical sensors.

Note: This effort has a larger spectrum as the plant will be able to detect a specific explosive rather than just a simpler breakdown product, as is the case with the Thale Cress, a genetically modified flower that turns to warning red when its roots come in contact with nitrogen-dioxide (NO₂), mentioned in the Flower-power could help clear landmines item (see below). (April 2004) Ref.424

Invasive Species of Genetically Modified Animals for Reconnaissance and/or Cleanup
As there have been international issues with genetically modified plant and food controversies, it is likely that there will be with genetically modified animals as well. "The report's authors said the most challenging issue facing these agencies is the development of biotech animals. "One concern is that they could escape and mate with wild relatives, spreading new genetic traits throughout wild populations," the 178-page report said." (April 2004) Ref.425

**Flower-power could help clear landmines**
Thale Cress, a genetically modified flower that turns to warning red when its roots come in contact with nitrogen-dioxide (NO₂) evaporating from explosives buried in soil, could help detect landmines. Scientists hope that Thale Cress might also be useful for detecting and cleaning soil contaminated by heavy metals such as lead, copper, zinc and chromium. Restricted tests will begin this year and the prototype might be ready within a few years, says the Danish developer, Aresa Biodetection. (January 2004) Ref.426

**Polymer Nanofibers Provide Chemical Warfare Defense**
Researchers at the Nanobioengineering Labs of the National University of Singapore's Faculty of Engineering have developed a polymer nanofiber membrane on which chemical warfare agents, like nerve gases, are physically adsorbed and then catalytically decomposed. Previous protective materials have only adsorbed the toxin, so their disposal presented a problem; here the chemical is actually destroyed. (June 2006) Ref. 427

**COUNTER BIOTERRORISM OR PANDEMIC TECHNOLOGIES**

- New On-the-spot Test for Avian Flu and Other Influenza Strains
- Chinese Find 16 Native Toxin-absorbing Plants
- Possible Cure for Bird Flu
- Genetically Engineered Vegetables as Vaccination System to Counter Bioterrorism
Assessment and Recommendations for Biosecurity

Antigenic Maps Help Trace Development of Diseases

Google to Support Development of Early Warning System in Vulnerable Regions

New Nanotube-based Design Yields More Sensitive Pathogen Detector

**New On-the-spot Test for Avian Flu and Other Influenza Strains**

Scientists at the University of Colorado are perfecting a new “chip” that can test almost instantly for 11 different influenza strains, including avian flu. The test device was already developed and tested for accuracy by the Centers for Disease Control and Prevention and researchers are working now to develop it into a user-friendlier on-the-spot test for influenza. Currently available technologies either take a long time to get a diagnosis of specific influenza strains; or, if giving faster results, do not differentiate among influenza strains. (November 2005) Ref. 428

**Chinese Find 16 Native Toxin-absorbing Plants**

Chinese scientists studied over 5,000 native plant species for their abilities to remove toxins (mainly heavy metals) from the environment. The five-year study identified 16 plants that could safely clean up pollutants such as arsenic or heavy metals, as well as techniques to process the resulting heavy-metal-absorbing plants so that they don’t become another pollution problem. The study estimated that using these plants costs less than one-tenth as much as the current chemicals-based cleanup techniques. One of the scientists said that “genes from the species identified could be used to genetically modify other plants” and hence, could enlarge the scope and spectrum of pollution-cleaning plants. (November 2005) Ref. 429

**Possible Cure for Bird Flu**

A scientist from the Laboratory of New Veterinary Drugs at the Lanzhou Institute of Animal Husbandry and Veterinary Drugs, part of the Chinese Academy of Agricultural Sciences, declares that he has used traditional Chinese medicine to develop a plant extract—hypercine — that can effectively treat poultry infected with the bird flu virus H5N1. The extract proved efficient in all cases tried on poultry and is now in testing on rats for eventual efficacy for humans. (November 2005) Ref. 430

**Genetically Engineered Vegetables as Vaccination System to Counter Bioterrorism**

At a meeting of the G-7 and WHO to discuss weapons of mass destruction and avian flu threats, Italian researchers launched the idea of a “vegetable-vaccination” by incorporating pathogens’ DNA into various vegetables’ genetic strings (such as potatoes and carrots), which when eaten would help produce antibodies and boost the body’s natural defense system against the pathogens. (November 2005) Ref. 431

**Assessment and Recommendations for Biosecurity**

The *Globalization, Biosecurity, and the Future of the Life Sciences* report by the Committee on Advances in Technology and the Prevention of Their Application to Next Generation Biowarfare Threats of the National Research Council, assesses the concerns related to developments in biomedical research under the circumstances of globalization. It reinforces the role of international scientific exchange; the need for national and international codes of ethics and conduct for researchers and scientists working in life sciences; and the need for improved health
infrastructure to respond to emergencies such as bioterrorist attacks or pandemics. It also recommends better integrated work between the scientific and intelligence communities to anticipate and manage the potential misuse of biomedical research and the technologies it generates. (June 2006) Ref. 432

**Antigenic Maps Help Trace Development of Diseases**

Derek Smith, professor of infectious disease informatics at Cambridge University’s Department of Zoology, and colleagues at Los Alamos National Laboratory and Erasmus Medical Center in Rotterdam, have developed software that, according to a *Scientific American* article, “create[s] an antigenic [stimulates the production of antibodies] map that documents 13,000 human flu strains isolated over the past five years When these results are plotted on a digital antigenic map, researchers can see in fine detail how the body’s immune system responds to different mutations of the virus.” (April 2008) Ref.433

**Google to Support Development of Early Warning System in Vulnerable Regions**

Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced $25 million in grants aimed at addressing global challenges. One of the five core initiatives, ‘Predict and Prevent’ aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying ‘hot spots’ and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated $5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University. (January 2008) Ref.434

**New Nanotube-based Design Yields More Sensitive Pathogen Detector**

Hiroshi Matsui, professor of bionanotechnology at Hunter College in New York, and collaborators from the Nanobiosensors and Molecular Nanobiophysics Group at the Research Center on Nanoscience and Nanotechnology at Universitat Autònoma de Barcelona in Spain, developed a new design for lab-on-a-chip pathogen (e.g., bacteria and viruses) detection devices, using an AC-driven peptide nanotube capacitance probe to increase sensitivity of the element. It appears that the design can be scaled up to provide multiple-threat detection in a single device, although there are challenging problems with registration of a number of electrodes. (December 2008) Ref. 435

**Promising Environmental-friendly Technologies**

- Proposed Uniform Device-Charging Scheme Could Yield Environmental Benefits
- Integrated Monitoring/Control System Aids Buildings’ Environmental Performance
- New Scheme for Wireless Sensor Networks Improves Many Metrics
- New “Nanohybrid” Plastic Is Stronger and More Biodegradable
- Biodegradation of Carbon Nanotubes Could Mitigate Potential Toxic Effects
- New Material Makes Biodegradable Plastic Bags
- Advanced Membrane Technology for Water Treatment to Counter Water Scarcity
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Sandia researchers develop unique ‘surfactant’ material
Sanitizing Fabrics for Environmental Workers
New Technique to Convert Liquids to Semi-solids and Back Again
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Nanotechnology Used to Produce Hydrogen for Fuel Cell Cars
The U.S. Army to use hydrogen fuel cell powered cars
Implications of the Growing Biofuels Industry
All-Electric cars coming from Norway and China with More than Hundred Mile Ranges
New Material for Storing Hydrogen
New Capacitor Promises 100× Improvement over Batteries in Charge/Weight Ratio
Bacteria-Generated Electricity from Waste to Power Fuel Cell
Converting CO₂ into Fuels using Sunshine
Polymer Dielectric Promises Higher Energy Storage
Nanotechnology Produces Battery/Capacitor in a Sheet of Paper
New Insight into Methane-converting Catalyst

**Increasing Energy Efficiency Technologies**
Small Omnidirectional Wind Turbines Could Provide Remote Power
Nano-based Solar Cell Material Offers Inexpensive Alternative
New Solar Cell Design Raises Efficiency
Improved Solar Cell Promised in a Year
Nanoparticles Increase Solar Cell Light-gathering Efficiency by 30%
Formic Acid Provides New Fuel Cell Medium
New Low Power Chip Suitable for Tiny Environmental Sensors
New Sunshine Distribution System Provides Energy-free Lighting
New Project for Nanowire Solar Cells
Magnetic Resonance Provides Short-range Power Source
Silicon Nanocrystals Promise More Efficient Solar Cells
Space-based Solar Power Has Significant Environmental Security Potential
Reducing Military Footprint with Solar Energy at 30 Cents per Watt
Energy-free Glow Material
Dye-sensitized Solar Cells Offer Shorter Energy Payback Time
World Record solar cell efficiency achieved
Photonic Crystal Provides 50% Cost Reduction
Refrigerator Temperature Sensor Mod Saves Energy
Biologically Based Dyes Dramatically Lower Solar Cell Costs
New Solar Cell/Battery Combination Saves Size and Weight
Genetically Engineered Virus May Improve Future Batteries
Urine-powered Battery
New Nanotechnology Batteries with Long Shelf Life
Tiny Batteries Offer Several Promises
New Promises for Flexible Solar Cells
Flexible Plastic Solar Cells Converting 30% of Sun’s Power into Usable Energy
Flexible Solar Cells could be sewn in Clothing
New Environmental-friendly Lighting Based on Gallium Nitride
Light Emitting Diodes Offer Big Environmental Advantages
New Technique Provides Cheaper LEDs

Proposed Uniform Device-Charging Scheme Could Yield Environmental Benefits
Green Plug of San Ramon California seeks adoption of its environment-friendly charging technology for battery-operated devices. The technique depends on a “smart” universal plug-in-the-wall charger that communicates with a proprietary chip in the attached user device to determine what voltage level to provide to it for recharging. Adoption of this hardware (which would use a single connector configuration) would allow a single multiple-outlet charger to service all portable devices at a given location. In addition to eliminating the proliferation of discarded obsolete chargers into electronic waste dumps, the technology, unlike conventional transformer-type chargers, also uses almost zero power when not actually supplying current. (November 2008) Ref.436

Integrated Monitoring/Control System Aids Buildings’ Environmental Performance
Agilewaves Inc. of Menlo Park, CA combined its Resource Monitor with a Crestron control system to produce a smart building system through which energy consumption can now be automatically tracked and controlled in real time. The Resource Monitor collects data from sensors placed in key areas, providing real-time information on resource consumption that can be broken down to specific floors, rooms, and appliances. It then alerts the Control System to act and keep energy consumption within limits by adjusting a thermostat, lights, water or blinds, for example. (July-August 2008.) Ref.437

New Scheme for Wireless Sensor Networks Improves Many Metrics
Los Alamos National Laboratory computer scientist Sami Ayyorgun developed a new communications scheme for wireless sensor networks that improves a number of network performance measures, e.g., connectivity, energy, delay, throughput, system longevity, coverage, and security. The technique depends on each node’s using a dynamically variable transmitting power, chosen according to an algorithm described in the paper. (July-August 2008.) Ref.438

New “Nanohybrid” Plastic Is Stronger and More Biodegradable
A new biodegradable ‘nanohybrid’ plastic that can be engineered to decompose much faster than existing plastics was developed by researchers of Cornell University. The plastic is a modified form of polyhydroxybutyrate (PHB), a promising biodegradable plastic produced from bacteria.
The use of PHB has been limited because of its brittleness and unpredictable biodegradation rates. The new material, which is also stronger than the original, contains nanoparticles of clay; its biodegradation rate depends on the amount of clay added. In one case it had almost completely decomposed after seven weeks, while the unmodified version was barely affected. However, bioplastics definition and recycling procedures are yet to be agreed upon and the need for international standards and regulations is increasing as the research and applications expand. (December 2007) Ref.439

**Biodegradation of Carbon Nanotubes Could Mitigate Potential Toxic Effects**
Work done by Dr. Alexander Star, Dr. Valerian Kagan, and colleagues, at the Univ. of Pittsburgh, and reported in Nanowerk, has shown that carbon nanotubes, which can have negative biological effects, can be destroyed by natural biodegradation through enzymatic catalysis, using horseradish peroxidase and hydrogen peroxide over a period of several weeks. This technique is milder and more natural than the previous method, which involved a harsh solvent consisting of sulfuric acid and high concentrations of hydrogen peroxide. (November 2008) Ref. 440

**New Material Makes Biodegradable Plastic Bags**
A research group led by Truong Phuoc Nghia at the Ho Chi Minh City University of Sciences has developed a nanocomposite plastic bag material that is less expensive than others, made from renewable sources, and is biodegradable in landfills. Its application may be somewhat limited by the facts that the resultant bags are reusable only if they do not come in contact with water, and that they rely on bacterial degradation for their low environmental impact. (January 2009) Ref. 441

**Advanced Membrane Technology for Water Treatment to Counter Water Scarcity**
The Advanced Membrane Technology for Water Treatment project conducted under the auspices of the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) seeks to develop advanced membrane technology for efficient, low energy processes to produce clean water from industrial and/or salt water resources, thus reducing the financial and environmental costs of addressing water scarcity problems. The research area consists of the following projects: low energy desalination membranes; membrane technology for industrial water reuse; and carbon nanotube (CNT) membranes. (May 2007) Ref. 442

**New Process Improves Water Desalination Efficiency**
Yale University researchers have developed a new energy-saving forward osmosis technique for water purification. The method, which is claimed to require only 10% as much power as previous ones, uses a new formulation for the “draw solution” in the osmosis process. Oasys Water, Inc. has been formed to exploit the discovery. (January 2009) Ref. 443

**Smog-Eating Materials**
Environment-friendly materials such as "smog-eating" products are increasingly in demand by architects and are developed not just for the façades of buildings, but also for paint, plaster, and paving materials for roads. An EU initiative for "smart" antipollution materials has found that construction products containing titanium dioxide help to destroy air pollutants found in car exhaust and heating emissions. The new environment-friendly substances are being tested in
buildings, squares and highways in Europe as well as Japan. (November 2006) Ref. 444

**New Power Sources Needed for the Soldiers of the Future**

At the request of the U.S. Army, the National Academies' Board on Army Science and Technology conducted research to assess the present and future technological needs for effective power systems for the “soldier of the future.” The report presents a review of various technology options, suggests future design concepts, and makes recommendations for more energy-efficient technology development and system design. (September 2004) Ref. 445

**Sandia researchers develop unique ‘surfactant’ material**

Sandia National Laboratories has developed a new class of surfactants (surface active agents) that are thermally degradable and easily removable in an inexpensive and environmentally friendly manner. These thermally cleavable (easily broken molecules) surfactants could have very large applicability in any field requiring modification of surface properties and where biodegradability is a primary concern. (June 2005) Ref. 446

**Sanitizing Fabrics for Environmental Workers**

Researchers from Cornell University and the University of California, Davis, have developed a technique for incorporating bacteria-killing halamides into fabrics that can then be used to produce protective clothing for personnel working in biologically hazardous environments, such as where anthrax may be present. They expect testing in 2006 and commercialization in 2008. (March 2006) Ref. 447

**New Technique to Convert Liquids to Semi-solids and Back Again**

Chemist Takeshi Naota, at Kyoto University in Japan, has developed a technique able to convert fuels, lubricants and paints into gelatinous semi-solids by adding a palladium-based compound and applying ultrasound. The process can be reversed by heat or more ultrasound to produce liquids. (June 2005) Ref. 448

**New Antibacterial and Antitoxin Textiles**

Researchers from North Carolina State University and textile scientists from Egypt have created a fabric that is up to 90% effective against three commonly occurring microorganisms: *Lactobacillus plantarum*, *E. coli* and *Staphylococcus aureus*. Unlike conventional methods of coating, this plasma-based process eliminates chemical wastes, making it a more environmentally sound investment. The antimicrobial agents are attached to the molecular structure of fibers, creating a permanent bond between the fibers and the agent so that washing and wearing do not reduce the efficacy.

Using nanotechnology, researchers from North Carolina State University and University of Puerto Rico have developed "smart textiles" by attaching nanolayers to natural fibers. These layers can be customized for different chemicals and can block agents such as mustard or nerve gas while keeping the fabric breathable. Nanolayers can be attached to a fiber without undermining its comfort or usability, providing very high levels of protection. (June 2005) Ref. 449

**Inorganic Fullerene-like Materials May Lower Hazards**

The Nano-materials Synthesis Group in the Israeli Weizmann Institute has developed a new class
of nanomaterials, inorganic fullerene-like substances, based on tungsten disulphide and similar compounds, rather than carbon. These materials, marketed commercially by ApNano, have many of the physical properties of true fullerenes, but are reported to be easier and cheaper to produce, chemically stable and less reactive, and less flammable. They also have been tested and purportedly found to be safe. (February 2006) Ref. 450

**New Protection for Plastic Electronics**

Researchers at the University of Texas at Dallas have developed a new form of self-healing for the metal oxide thin film layers that protect the plastic covering for a wide variety of electronic devices, e.g., displays, low-cost solar cells, and chemical- and pressure-sensitive sensors. These layers are subject to damage from moisture and flexing. The technique uses a nanocomposite material that combines a water-degradable polymer and a titanium tetrachloride healing agent, which act together to seal minute defects in the protective layer. (December 2008) Ref. 451

**Infrared Radiation for Deicing Aircrafts Cuts Pollution**

A system for cutting pollution by deicing aircraft with infrared radiation rather than chemicals is being further tested at the Oslo airport. This heat-inducing system replaces the present technique of spraying the aircraft with anti-freeze or glycol, which pollutes the environment. The InfraTek Radiant Energy Deicing System is built by the Radiant Energy Corp. of Port Colborne ON, and is already in use at Newark International Airport, and at Rhinelander-Oneida County Airport, Wisconsin, with a hangar under construction at JFK. (November 2005) Ref. 452

**New Techniques May Help Solve Wind farm/Radar Problem (update)**

A previous item in these reports [Wind Power vs. Air Defense Radar, March 2004] reported on the problem arising when return signals from wind farm fans interfered with military aircraft control radar systems. Two new developments offer some hope of solutions to this conflict. BAE Systems in the UK has produced a signal-processing algorithm, which uses fuzzy logic to filter out the returns from the rotating blades, leaving only genuine aircraft tracks. The system will be tested this summer and may be ready in a year. Stealth technology for the moving surfaces is also being investigated as a possible way of hiding the blades from the radar beam.

Another approach is being taken by Grimshaw Architects in association with Windpower Ltd, whose Aerogenerator is a Darius-principle wind turbine with a vertical axis that can be operated at ground level (or rather, sea level, since it's planned for off-shore use.). (July 2005) Ref. 453

**New Technique May Solve Wind Farm Interference with Radars**

Cambridge Consultants Ltd. of Cambridge UK and Boston MA is working on the development of a holographic-infill radar, which aims to solve the problem of wind turbine interference with air traffic radars. The system works by covering the area of the turbines with a short-range radar “patch” with a different characteristic. A test has shown that the method provides a Doppler effect for a target moving on the ground different from one produced by a turbine, a distinction, which it is believed would enable a full-scale system to detect an aircraft intrusion into a wind farm interference area. Flying tests are planned. (November 2008) Ref.454

**Space Elevator Technology has both economic and environmental benefits for the military**

Space elevator technology, centered on the concept of stretching a light but strong ribbon from the surface of the earth to a point in space geosynchronous with the location of the ground end,
quickly approaching technical feasibility. Such technology could be used to boost payloads into earth orbit at an economy of scale that rocket technology cannot match. Preliminary studies indicate that this technology could be ready in 15 years. (August-September 2003) Ref.455

**Korean Nanotechnology production techniques Cut Costs and Environment Impact**

Prof. Taeghwan Hyeon and associates at Seoul National University's School of Chemical Engineering have announced the development of a safe and inexpensive way to directly produce a large amount of monodisperse (uniformly sized) nano-crystals using non-toxic salts. Hyeon said that these are truly revolutionary findings, enabling large-scale production of nano-particles at low cost—just 250 won (about 25 cents) per gram. His team used metal salts as a reactant to regularly produce as much as 40 grams in a single reaction. Although the technique reduces the environmental impact in production, it does not mean it reduces the environmental impact of the nanomaterials after production and application. (December 2004) Ref. 456

**'On-Off Switch' for Buckyball (C60) Toxicity**

Researchers at Rice University's Center for Biological and Environmental Nanotechnology (CBEN) have demonstrated that adjusting the surface properties of buckyballs can control the nanoparticles’ toxicity. They identified specific surface alterations that can reduce or augment buckyballs’ toxicity depending on the purpose for which they are designed. Although just at the cytotoxicity level, these findings are important for buckyball toxicological risk assessment, and more extensive toxicological studies are already planned. However, this should not be confused with the concept of creating “off-switches” for future nanoweapons, a requirement in need of research and development. (September 2004) Ref. 457

**Zircon Options for Nuclear Waste Storage**

Cambridge-MIT Institute (CMI) in the UK discovered that the mineral zircon (ZrSiO₄) might be a solution for long-term nuclear waste storage. Computer simulations show that when radioactive materials heavily damage the zircon, the atoms rearrange themselves to form a protective shell around the damaged area. Once the principle is proven and it’s fully understood what is going on at the atomic level, then it will be possible to explore alternative materials that could be produced on a much larger industrial scale. (July 2004) Ref. 458

**Biodegradable Mobile Phones**

Researchers at the University of Warwick, together with high tech materials company PVAXX Research and Development Ltd, and Motorola, designed a mobile phone that can be turned into compost and even flower when discarded. The phones are made of a new high tech biodegradable material, which disintegrates in a few weeks when buried in compost, and grows a flower from a seed placed in the phone’s cover. (December 2004) Ref. 459

**Degradable Plastic Could Reduce Environment Footprint**

David R. Tyler, a chemist at the University of Oregon, and his colleagues have developed a molybdenum/chlorine-containing plastic which degrades to dust in three days under exposure to light. Items made from this material would, of course, have to be limited to those concealed from illumination until used, and then be required to function for only a short time. However, this disintegration property would offer a simple, environmentally friendly solution to disposal of used devices meeting the above constraint. (April 2005) Ref. 460
Nanomaterials Help Stop Bullets
Bulletproof vests' performance could be improved by chemically attaching different nanoparticles to already well-known materials such as Kevlar, says Professor Victor Castano, of the Universidad Nacional Autónoma de México. Ceramic nanoparticles would make the material UV-shielded, and chemically functionalized nanoparticles linked to organic structures could be used for waterproofing. (November 2004) Ref. 461

Environmentally Polluting Ash Turned into Concrete-like Structural Material
Prof. Mulalo Doyoyo of Georgia Tech’s School of Civil and Environmental Engineering has developed a new structural material, Cenocell, that is produced by treating with organic chemicals fly ash and bottom ash left over from coal burning systems. It offers high strength and light weight, uses no cement, and could replace concrete, wood and other materials in many applications. (November 2008) Ref.462

Another “Green” Concrete Announced
In a press release, Ekocrete, Inc. announced, “…the availability of a new ‘green’ concrete that uses 90% recycled and by-product materials without sacrificing strength or durability.” The new product uses crushed recycled concrete for aggregate, plus fly ash waste from coal mills, and other industrial byproducts that provide nano-fibers for crack reduction and nano-particles for surface density to reduce water penetration. (January 2009) Ref. 463

Technologies for New Generation of Cars

Promising Research for Emission-Free Car that Makes Its Own Fuel
A unique project in the incubator program of the Chief Scientist in Israel called Engineuity has put several technologies together to create a stable metal combustion system that avoids oil and pollution. The technique is based on a metal-steam combustor system that produces a continuous flow of hydrogen using water and common stable metals such as magnesium and aluminum. At high temperature and pressure, the metals combine with the oxygen from water forming an oxide and liberating the hydrogen to be used by the car. The metals can be recovered and recycled. The research leader in an audio recording referenced below claims that adapting conventional cars to run on the Engineuity technology should be easy and the overall running cost would be about the same as today’s cars. Pending investments, a prototype car based on the new system could be demonstrated to commercial auto companies in three years. (October 2005) Ref. 464

Hydrogen Tablets
Scientists at the Technical University of Denmark (DTU) have invented a hydrogen tablet that can efficiently and safely store and transport hydrogen in a solid form. The tablet consists solely of ammonia absorbed efficiently in sea-salt. When hydrogen is needed, ammonia is released through a catalyst that decomposes it back to free hydrogen. The tablet can be simply recharged just by a “shot” of ammonia. DTU and SeeD Capital Denmark have founded the company Amminex A/S to develop and commercialize the technology. (September 2005) Ref. 465
Hydrogen Farming as a Possible Alternative to Petroleum
If biological and technological obstacles (already identified) can be resolved, then hydrogen farming might become an alternative to petroleum production in 10-20 years, according to Tasios Melis of the University of California, Berkeley. His research is one of several funded by the DOE, aimed at trying to use algae to provide cheap and environmentally friendly hydrogen. It is based on the use of transparent tubes full of water inoculated with the green alga Chlamydomonas reinhardtii, which when put out in the sun naturally produces hydrogen as a by-product of photosynthesis. A system of such tubes with hydrogen collection capacity would form a hydrogen farm. "To displace gasoline use in the US would take hydrogen farms covering about 25,000 square kilometers" (less than a tenth of U.S. soy bean fields), says the researcher. (February 2006) Ref. 466

Biodiesel Increasingly Considered a Viable Alternative to Crude Oil
Growing demand for green fuels brings biodiesel into the spotlight of the global oils industry. It was the focus of the two-day Price Outlook Conference for edible oils, held in Kuala Lumpur, Malaysia, as Southeast Asian countries are looking into increasing their biofuels production. Malaysia and Singapore are the world's leading palm oil producers. Solomon Islands plans to replace its imported fuel with internally produced coconut oil with the help of three Australian companies. Major increased biodiesel demand is expected to stem from the EU policy that, by 2010, 5.7% of its diesel fuel must be biodiesel. (February 2006) Ref. 467

Synthetic Biology to Produce Hydrocarbon-based Fuels
LS9, a synthetic biology company based in San Carlos, CA, has genetically engineered various bacteria, including E. coli, to custom-produce hydrocarbons that could be processed into fuel. A pilot plant is planned for 2008, and sales of synthetic biocrudes to refineries for further processing are expected within three to five years. Another company, Amyris Biotechnologies, of Emeryville, CA, is using plant and animal genes to make microbes produce renewable hydrocarbon-based fuels. (August 2007) Ref.468

Nanotech Lithium-Ion Battery Material Promises 10x Capacity Increase
Stanford University Assistant Professor Yi Cui has developed an electrode material for lithium-ion batteries (used in laptops, iPods, video cameras, and cell phones) that increases their energy storage capacity ten times above current batteries. This could help make future electric cars more attractive. The material uses silicon nanowires to hold the charge-bearing lithium ions. Silicon structures can hold more lithium than the conventional carbon, but tend to disintegrate because of size changes during recharge cycles; the nanowires do not exhibit this characteristic. (December 2007) Ref.469

New Inter-electrode Material Yields 50% Fuel Cell Power Increase
MIT Professor Paula T. Hammond and her team produced a new thin film material for the membrane separating the electrodes in direct methanol fuel cells. The current material is not impervious to methanol leakage across the boundary. Applying the new film produced a 50% gain in power output from the cell. Drexel University chemical engineering professor Yossef Elabd had earlier investigated the leakage mechanism in the present membranes, and produced several other alternatives. (May 2008) Ref.470
Compressed Air Car May Offer Environmental Advantages
Zero Pollution Motors of New Paltz, NY is developing a compressed air vehicle planned for US production in 2010. The car may be viewed as an analogue of an electric car, with the battery replaced by a tank filled with air previously compressed by any electric energy source. The air runs a 2-, 4- or 6-cylinder engine, replacing the pressure otherwise generated by the explosion of fossil fuel vapors in the cylinders. (November 2008) Ref.471

New Catalysts Improve Hydrogen Generation Processes for Energy Storage
Prof. Daniel Nocera of MIT announced development of a new electrolyzing technique that provides an efficient way to use electricity, as generated by solar panels or a wind farm, to split water into hydrogen and oxygen for storage and later use in a fuel cell. The technique is based on a novel cobalt/phosphate catalyst that allows the process to be carried out in an inexpensive non-specialized environment.
Similarly, scientists of Monash Univ. “have developed an efficient water oxidation catalyst, based on a manganese cubane cluster, which combines features of photosynthetic enzymes with the light harvesting power of dye-sensitized solar cells … [and, paired] with a proton reducing catalytic cathode, … have produced a photoelectrochemical cell that produces pure H2 and O2 from water and sunlight.”
Finally, Prof. Umit Ozkan, of Chemical & Biomolecular Engineering at Ohio State University, designed an inexpensive cerium-based catalyst that produces hydrogen from ethanol or other biofuels. This would allow conversion from liquid fuel to hydrogen to be done at the final fueling point. (July-August 2008.) Ref.472

New Materials Provide Hope for Improved Ultra-capacitor
EEStor, of Cedar Park TX, claims that its electrical energy storage unit will have more than three times the energy density of the top lithium-ion batteries today. The unit is based on a ceramic material consisting of a barium titanate powder coated with aluminum oxide and a type of glass material. Some experts have expressed doubts about the material’s ability to withstand the high voltage gradients necessary to achieve the stated capacities, but others are more supportive. (July-August 2008.) Ref.473

New Materials Provide Improved Ultracapacitor Storage
Hao Zhang of the Research Institute of Chemical Defense in China is lead author of a paper in Nano Letters describing a new structure for ultracapacitor electrodes consisting of flower-shaped manganese oxide nanoparticles deposited on carbon nanotubes vertically grown on a tantalum-foil base. The authors report that the new arrangement delivers five times as much power as activated-carbon electrodes. Cost may be a problem with this technique. Also, Prof. Rod Ruoff of the University of Texas at Austin is working with graphene as an electrode material, and believes that it may double the storage capability of ultracapacitors. Jiyoung Oh and Mikhail “Mike” Kozlov at the Univ. of Texas at Dallas’ NanoTech Institute are conducting similar work using sheets of single-walled carbon nanotubes embedded with the polymer polypyrrole. (September 2008.) Ref.474

Clean Green Hydrogen-Making Process
Lanny Schmidt, Brandon Dreyer and colleagues at the University of Minnesota's Department of Chemical Engineering and Material Science have developed a new process called "flash
volatilization" that can turn waste biomass into hydrogen. It uses rhodium and cerium as chemical catalysts, is supposed to be 100 times faster than existing techniques, and is scalable. It generates a hydrogen and carbon monoxide gas mixture called synthesis gas, or "syngas" which can be used to make fuels, or its hydrogen can be separated in order to power fuel cells. (December 2006) Ref. 475

**New Generator Produces Hydrogen from Aluminum and Water**

Prof. Jerry Woodall of Purdue University and associates have developed a new technique that uses aluminum-gallium alloy pellets to generate hydrogen from water, providing a novel source for the new "green fuel". Aluminum reacts with the oxygen in water, releasing hydrogen and transforming into aluminum oxide (alumina). The key to the new process is the use of gallium, which prevents the formation of a skin over the aluminum that would stop the process—with the gallium, all the aluminum in a container can contribute to the reaction. The researchers envision that the alumina could be recycled back into aluminum by electricity derived from nuclear plants. The advantage of this indirect hydrogen fuel process is that aluminum is much more easily stored and transported than hydrogen, so there are potential gains in producing the hydrogen at the point of use in an “aluminum-fueled” engine. However, serious questions come to mind about the environmental effects and the overall cost and energy efficiency of producing and recycling the aluminum, and transporting it and the alumina, and about driving range with a feasible load of metal. This complex “non-rechargeable battery” will require much careful end-to-end analysis in order to gain acceptance, but it is an interesting approach. (May 2007) Ref. 476

**Enzyme-based Biofuel Cells Using Nanotechnology**

A team of Japanese scientists from Kyoto University in Japan has engineered carbon electrodes with carbon nanoparticles to develop a simple biofuel cell based on direct electron transfer-type bioelectrocatalysis. The cell uses enzymes to catalyze oxidation of D-fructose and reduction of dioxygen to generate electricity, without needing a mediator molecule. This might represent a significant development for simplifying the construction of biofuel cells. (February 2007) Ref.477

**Printing Fuel Cells**

EoPlex Technologies, in Redwood City, CA has developed a process, which allows the printing of three-dimensional structures with "ink" containing various materials, such as polymers, metals, and ceramics, layer by layer. Microreactors for chemical and drug processing, miniature fuel cells, wireless sensors, and thermal management systems are just some of the envisioned applications of this technology able to cheaply and easily create microscale devices. (October 2006) Ref. 478

**New Device to Suck CO2 from the Air**

Towers with materials that absorb carbon dioxide (CO2) directly from the air and then release it as a pure stream of carbon dioxide for sequestration have been developed by scientists from Columbia University and Global Research Technologies, LLC. It is estimated that if these devices had openings 10 meters by 10 meters they could each extract about 1,000 tons each year; hence, one million of these units could remove 1 billion tons of CO2 from the air per year. These could be placed at the best locations for carbon sequestration, regardless of carbon source. (April
Ion Jelly Electrolyte Offers Environmental Advantages
A team of researchers led by Susana Barreiros at the New University of Lisbon, Portugal, has developed a conducting “ion jelly” for use as an electrolyte in batteries and fuel cells. The new technique is superior to previous methods of turning environmentally friendly ionic liquids into solids. (October 2008) Ref. 480

New Lithium-ion Battery Offers Multiple Advantages
A123 Systems of Watertown MA developed a new lithium-ion battery design with significant advantages for demanding mobile applications, such as electric vehicles and portable electronic devices. The new units feature greatly increased safety (not bursting and igniting, when overheated or damaged), longer life, and greater energy capacity, stemming from an innovative electrode material that contains nanoparticles of lithium iron phosphate modified with trace metals. (May 2008) Ref. 481

Sandia Advancing Research on Batteries' Life and Safety
As part of the Department of Energy-funded FreedomCAR program, Sandia National Laboratories’ Power Sources Technology Group is researching ways to make lithium-ion batteries work longer and more safely. According to an SNL news release, the research could lead to these batteries being used in new hybrid electric vehicles in the next five to ten years. The work is centered on developing a higher degree of abuse tolerance in the batteries. Another project at Sandia is studying key phenomena that affect the durability and byproduct management of hydrogen-fueled PEM (proton exchange membrane or polymer electrolyte membrane) fuel cells, which are also important candidates as components for advanced vehicles. [See related item Update on more efficient vehicles: Program of the FreedomCAR and Fuel Partnership in July 2005 environmental security report.] (January 2006) Ref. 482

EU ‘hydrogen research strategic agenda’ expects to replace 20% of vehicle fuels with alternative fuels by 2020
The European Union (EU) announced its ‘hydrogen research strategic agenda’. The EU hopes to replace 20% of vehicle fuels with alternative fuels by 2020. By way of background, a National Science Foundation official has told the Millennium Project, that methanol may well prove more feasible than hydrogen for fuel cells, but hydrogen is the current direction of research. The EU will fund hydrogen development and deployment research projects in order to develop a sustainable hydrogen economy, with component technologies for applications in transport, stationary and portable power. The EU strategy will include a policy framework across transportation, energy, and environmental domains, a public-private partnership to promote commercialization, and a framework to develop international co-operation. (August-September 2003) Ref. 483

Nanotechnology Used to Produce Hydrogen for Fuel Cell Cars
Using nanotechnology, scientists from the Department of Physics and Astronomy, and Laboratory for Surface Modification, Rutgers, The State University of New Jersey, might have found an efficient and environmentally friendly solution for the hydrogen fuel cell-powered car industry. The nanostructured catalyst-based hydrogen production technology seems also to
provide solutions for safe and easy distribution by “binding hydrogen with atmospheric nitrogen into ammonia molecules,” so that the “resulting liquid could be handled like gasoline and diesel fuel”, thus avoiding the high costs involved in building a new infrastructure for fuel cells. Using this technology, “pure hydrogen could be extracted under the vehicle's hood on demand, as needed by the fuel cell, and the remaining nitrogen released back into the atmosphere. The atmosphere is normally four-fifths nitrogen, so the nitrogen emissions are not viewed as polluting” comments an Environment News Service article. (April 2005) Ref. 484

The U.S. Army to use hydrogen fuel cell powered cars enables to reduce logistics costs around the world and comply with future environmental requirements for overseas bases
The U.S. Army recently announced that General Motors agreed to develop an off-road vehicle for the military powered by hydrogen fuel cells. California-based Quantum Fuel System Technologies is to build the prototype vehicle. This reflects the recent focus by the U.S. government on using alternative fuel systems to power the country’s military, enabling it to reduce logistics costs around the world. (In Iraq, for example, a gallon of fuel cost about $400 due to the transportation costs of moving the fuel around the world and around the battlefield.) (October 2003) Ref.485

Implications of the Growing Biofuels Industry
Global ethanol production more than doubled between 2000 and 2005 and biodiesel expanded nearly fourfold versus oil production that increased by only 7% over this period, notes Biofuels for Transportation: Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century report by Worldwatch. Since the world’s oil demand and prices are increasingly hindering energy security and development, there are strong growing incentives for the biofuels industry and increased trade. Furthermore, 25 of the world’s 47 poorest countries import all of their oil, while having a substantial agricultural base to grow energy crops. While noting the advantages of biofuel industry, the report also warns of the problems such as replacing food crops for energy crops, expansion of agricultural land, and water needs. International biofuel trade regulations and standards will be needed. (June 2006). Ref. 486

All-Electric cars coming from Norway and China with More than Hundred Mile Ranges
An all-electric car is expected to be available for purchase next year (2009) in the U.S.; it is called “Think City” from Think North America, a Norwegian-California joint venture startup. The car runs on sodium or lithium batteries and can travel up to 110 miles on one charge. In 3-5 years BYD Auto Co. of Shenzhen, China, plans to market its all-electric car in the U.S. with a 185-mile range on a single full charge. (April 2008) Ref.487

New Material for Storing Hydrogen
Physicists Adam Phillips and Bellave Shivaram of the University of Virginia have found a new class of materials, transition metal-ethylene complexes, which may offer a much more efficient way of storing hydrogen for fuel cell applications than previous substances. An example uses titanium with an ethylene nanostructure, which their measurements indicate will hold 12% by weight of hydrogen, more than twice the target of 5.4% set by DOE to support the development of hydrogen fuel cell vehicles. (April 2008) Ref.488
New Capacitor Promises 100× Improvement over Batteries in Charge/Weight Ratio
Lockheed Martin has signed an agreement with EEStor of Cedar Park, Texas for the military applications of a new type of ultracapacitor based on barium titanate that Lockheed Martin believes will be able to hold 10 times the energy in 1/10th the weight of typical batteries. (January 2008) Ref.489

Bacteria-Generated Electricity from Waste to Power Fuel Cell
Microbial fuel cell technology, being developed by scientists from Arizona State University’s Biodesign Institute, is based on the use of bacteria to convert a variety of liquid organic waste (such as sewage or pig manure) into electricity. (January 2008) Ref.490

Converting CO₂ into Fuels using Sunshine
The Sunlight to Petrol (S2P) project developed by researchers at Sandia National Laboratories in New Mexico is using sunlight to convert CO₂ into fuels like methanol or gasoline. Although the innovation seems to be working, large-scale implementation could take 15-20 years to reach industrial scale. (January 2008) Ref.491

Polymer Dielectric Promises Higher Energy Storage
North Carolina State Univ. physicist Vivek Ranjan and colleagues have discovered that combining the polymer polyvinylidene fluoride (PVDF) with chlorotrifluoroethylene (CTFE)—another polymer—produces a dielectric material that may allow capacitors to store up to seven times more energy than those currently in use. (July 2007) Ref.492

Nanotechnology Produces Battery/Capacitor in a Sheet of Paper
Scientists from the Rensselaer Polytechnic Institute have developed a device that resembles a sheet of paper in all respects, but that can serve as a battery or capacitor. The material is formed from cellulose and carbon nanotubes, and can be soaked with any of a variety of fluids (including sweat or blood) to serve as an electrolyte. It can operate at temperatures between -100 and +300 degrees Fahrenheit and can be printed like paper. (August 2007) Ref.493

New Insight into Methane-converting Catalyst
New work reported by the International Consortium for Clean Energy, a collaboration among DOE's Pacific Northwest National Laboratory, the Chinese Academy of Sciences' Dalian Institute of Chemical Physics, and China's Institute of Coal Chemistry, sheds light on the optimum structure for a catalytic material, molybdenum oxide on a zeolite substrate, which can turn methane into benzene. (May 2008) Ref.494

Increasing Energy Efficiency Technologies
Small Omnidirectional Wind Turbines Could Provide Remote Power
quietrevolution ltd. [sic] of London, England, has developed a wind turbine, which is silent, only 16’ tall and 9’ in diameter, and responds to wind from any direction. The manufacturer estimates its probable output on a typical site at 6000-10000 kWh per year, i.e., up to about 1 kW continuous equivalent. Further development is expected to greatly reduce its current cost of almost $45,000 plus installation. (September 2008) Ref.495
Nano-based Solar Cell Material Offers Inexpensive Alternative
Scientists at New Jersey Institute of Technology's Department of Chemistry and Environmental Sciences have developed an inexpensive polymer solar cell material that can be painted or printed on flexible plastic sheets. The material uses a carbon nanotube complex combined with buckyball fullerenes, and offers a cost advantage over purified silicon. [See also Biologically Based Dyes Dramatically Lower Solar Cell Costs in April 2007 and Photonic Crystal Provides 50% Cost Reduction in March 2007 environmental security reports.] (July 2007) Ref.496

New Solar Cell Design Raises Efficiency
Prof. Ely Sachs and colleagues at MIT have developed a solar cell design that offers a 27% increase in efficiency over existing devices. They predict that the cells’ present cost of $1.85/watt can be reduced to about $1.35/watt. The new multi-crystalline silicon cells embody several improvements, which increase the amount of light reaching the active elements in the cells. Commercialization of the development is being done by 1366 Technologies. [See also New Project for Nanowire Solar Cells in January 2008, Reducing Military Footprint with Solar Energy at 30 Cents per Watt in November 2007, and other similar items in previous environmental security reports.] (April 2008) Ref.497

Improved Solar Cell Promised in a Year
SUNRGI Company announced the development of a solar cell technology which they say will deliver power at 7¢/kWh, around the price of coal-fired energy. Their panels use lenses to concentrate sunlight, and a proprietary cooling system to prevent consequent cell damage from heating. Start of production is scheduled for mid-2009. IBM has also released details on a similar technique. (May 2008) Ref.498

Nanoparticles Increase Solar Cell Light-gathering Efficiency by 30%
Work led by Kylie Catchpole, now at the Australian National University, has resulted in the discovery that a thin film of metallic nanoparticles applied to the surface of a solar cell can increase light capture for long-wavelength light by a factor of more than ten, and improve overall cell light-gathering efficiency by 30%. (December 2008) Ref. 499

Formic Acid Provides New Fuel Cell Medium
Matthias Beller and colleagues at the Leibniz Institute for Catalysis, in Rostock, Germany have developed a technique to convert formic acid into hydrogen at low temperatures (26°C to 40°C). The new process is suitable for low-power fuel cell applications, like mobile electronic devices, rather than for vehicle usage. It does not require a high-temperature steam reforming unit, as methanol does (instead, it is converted to hydrogen by a ruthenium-based catalyst) and its power/weight ratio is only one-third that of methanol. (May 2008) Ref.500

New Low Power Chip Suitable for Tiny Environmental Sensors
The new Phoenix Processor, developed by Scott Hanson and Mingoo Seok at the Univ. of Michigan’s Dept. of Electrical Engineering and Computer Science, uses just 30 picowatts in sleep mode and only 90 nanowatts in active mode. The chip measures 1 mm², the same as its battery, which can be so small because of the low power requirement. The small size means that the sensors using the chip could be scattered around in an environment-sensing network. The chip contains a built-in low power timer that causes it to run on a 0.1 sec/10 min awake cycle,
suitable for sensing applications. (June 2008) Ref.501

**New Sunshine Distribution System Provides Energy-free Lighting**
The Solatube system collects sunlight from a rooftop unit and distributes it to interior spaces through specially designed optical tubes, eliminating the need for external power for illumination when daylight is sufficient. (January 2008) Ref.502

**New Project for Nanowire Solar Cells**
The Department of Engineering Physics at McMaster University in Hamilton ON, Cleanfield Energy, and the Ontario Centres of Excellence (OCE) have formed a partnership for a three-year project to pursue the commercialization of nanowire technology in the production of more affordable solar cells. (January 2008) Ref.503

**Magnetic Resonance Provides Short-range Power Source**
Marin Soljacic of the Massachusetts Institute of Technology has developed a technique for transmitting electric power at usable efficiency over distances of a few meters, using tailored oscillating electric and magnetic fields. Dr. Zhong Lin Wang and colleagues at the Georgia Institute of Technology have succeeded in using nanotechnology to produce an electric generator that can be embedded in the human body and may have the potential, when fully developed, of producing usable amounts of power from such mechanical sources as the pulsation of the arterial system. The combination offers locally produced, locally consumed, and environmentally friendly electricity. (July 2007) Ref.504

**Silicon Nanocrystals Promise More Efficient Solar Cells**
Scientists at the National Renewable Energy Laboratory (NREL), in Golden CO, have shown that silicon nanocrystals can increase the efficiency of conventional solar cells from its present 20% to 40%, at much lower cost than other approaches to high efficiency cells. [See also *Nano-based Solar Cell Material Offers Inexpensive Alternative* in July 2007 and other previous environmental security reports.] (August 2007) Ref.505

**Space-based Solar Power Has Significant Environmental Security Potential**
A US National Security Space Office (NSSO) report, Space-Based Solar Power: As an Opportunity for Strategic Security, states that Space Based Solar Power (SBSP) can reduce half a trillion dollars a year in military costs by stopping energy-related wars before they start, and that SBSP can be tested in orbit within five years. SBSP has the potential to provide base load electricity on a global basis without producing greenhouse gases or nuclear waste. Geostationary satellites could convert solar energy into electromagnetic beams that are transmitted to receivers around the world that feed local electric grids. The report argues that military leadership in development and demonstration is probably necessary to speed civilian commercialization, as was the case with the Internet. One hundred and seventy academic, scientific, technical, legal, and business experts around the world participated in the study. The Executive Summary of the NSSO report states that, “…perhaps the greatest military benefit of SBSP is to lessen the chances of conflict due to energy scarcity by providing access to a strategically secure energy supply.” (October 2007) Ref.506
Reducing Military Footprint with Solar Energy at 30 Cents per Watt
Current solar photovoltaic technology costs about $3.00 per watt. Nanosolar Inc. has announced that it will lower costs to $0.30 per watt, commercially available next month. The new production process makes the solar cell sheets 100 times thinner and 100 times faster with solar-absorbing nano-ink that can transfer sunlight into electrical power. [See also Nano-based Solar Cell Material Offers Inexpensive Alternative in July 2007 and other similar items in previous environmental security reports.] (November 2007)507

Energy-free Glow Material
MPK Co. of Clayton, WI has developed a tritium-based material, “Litrosphere”, which produces a low-level glow for more than 12 years without energy input. Trace tritium beta decay in phosphor microspheres provides the energy source. Safety is claimed. It can cover a standard sheet of paper for about 35 cents, comes in a variety of colors, and can take the form of either paint or injection-molded plastic. Its luminous output cannot compete with conventional lighting sources, but it is highly suitable for marking objects that need to be spotted in the dark, saving energy and lowering maintenance requirements. (December 2007) Ref.508

Dye-sensitized Solar Cells Offer Shorter Energy Payback Time
It is estimated that conventional photovoltaic solar cells must be in service for around three years before they have produced as much energy as that required to manufacture them. However, the “Gräetzel” or “dye-sensitized” solar cell has now gone into large-scale production. This type of device uses a combination of titanium dioxide and an organic dye molecule, often containing ruthenium, which are immersed together in a liquid electrolyte. A Netherlands independent photovoltaic-research firm has estimated that such dye-sensitized cells installed in southern Europe would have as short an energy payback time as six months. G24 Innovations, in Cardiff, Wales, has announced that it expects to be able to make enough dye-sensitized photovoltaic cells each year to provide 30 megawatts of peak generation capacity. Other companies are also pursuing this development. (December 2007) Ref.509

World Record solar cell efficiency achieved
Spectrolab, a subsidiary of Boeing, announced the development of a new solar cell that can convert 40.7% of the sunlight into electricity. The conversion efficiency of today’s conventional solar cells is between 12% and 18%. The Department of Energy claims that ‘this breakthrough may lead to systems with an installation cost of only $3 per watt, producing electricity at a cost of 8-10 cents per kilowatt/hour, making solar electricity a more cost-competitive and integral part of our nation’s energy mix.’(January 2007) Ref.510

Photonic Crystal Provides 50% Cost Reduction
StarSolar, in Cambridge MA, has developed a technology which allows a solar cell to produce the same amount of electricity with much less silicon, thereby cutting the cost of the energy by up to half, according to the developing organization, a licensee of MIT. The technique uses a so-called photonic crystal to reflect the incident light in such a way that more of it reaches the silicon layer, which can therefore be thinner. (March 2007) Ref. 511

Refrigerator Temperature Sensor Mod Saves Energy
The UK firm eCube Distribution Ltd., of Ilford, Essex, is marketing a device that modifies the
operation of a refrigerator's temperature sensor in a way that may significantly reduce the unit's energy consumption. It consists of a wax sleeve that fits around the sensor and which has the thermal characteristics of a solid like food. An unmodified refrigerator senses the temperature of the air in the unit, rather than that of the contained food. When the door is opened, the temperature of the air rises rapidly, often triggering the cooling element to start, even though that of the food remains unchanged. The modified sensor causes cooling to be activated only when the temperature of the actual contents exceeds the preset limit. In a test in a hotel, where the doors are frequently opened and closed, the device reduced energy consumption by 30%. (March 2007) Ref. 512

**Biologically Based Dyes Dramatically Lower Solar Cell Costs**
Massey University's Nanomaterials Research Centre in Wellington, New Zealand, has developed a range of colored dyes for use in dye-sensitized solar cells that promises to lower costs by 90% compared to silicon-based photo-electric solar cells. The dyes are related to such organic molecules as chlorophyll and hemoglobin. The cells have the added advantage of working well in low-light environments. (April 2007) Ref. 513

**New Solar Cell/Battery Combination Saves Size and Weight**
A new family of batteries incorporating solar cells for self-charging is being developed by an international partnership of Konarka Technologies of Lowell MA, a maker of thin-film "plastic" solar cells, and the German company VARTA-Microbattery, which layered Konarka's technology onto a lithium-polymer battery. Not only are the new devices small and light, they also operate even at lower levels of illumination. (April 2007) Ref. 514

**Genetically Engineered Virus May Improve Future Batteries**
A genetically engineered virus has been used by scientists at MIT to produce the positive electrode of a lithium-ion battery. The virus proteins contain an amino acid that binds to cobalt ions in a solution, giving the proteins, after some treatment, a coating of cobalt oxide, which has much higher storage capacity than the carbon-based materials now used in lithium-ion batteries. A further improvement was obtained by adding gold as an ingredient, in addition to cobalt. This technique holds a promise for much improved battery manufacturing methods, although much development remains to be done. (April 2006) Ref. 515

**Urine-powered Battery**
Ki Bang Lee and a team of researchers at Singapore's Institute of Bioengineering and Nanotechnology have developed a very inexpensive and miniaturized power source suitable for biochips used for healthcare testing and disease detection, as in a BW situation. The battery is formed by soaking a credit-card-sized piece of paper in copper chloride, sandwiching it between strips of magnesium and copper, and laminating it between transparent plastic films. When the paper is moistened with a drop of urine, the device generates 1.5 volts of electricity. (August 2005) Ref. 516

**New Nanotechnology Batteries with Long Shelf Life**
Scientists at Lucent Technologies Bell Labs have developed a new class of batteries, which they call "nanobatteries". They are estimated to have a shelf life of at least 15 years, and are based on a silicon "nanomembrane" whose tiny honeycomb-like grid holds the electrolyte away from the
electrodes until power is needed, at which point it becomes liquid-permeable, releasing the electrolyte drops to pass through, activating the cell. (February 2006) Ref. 517

**Tiny Batteries Offer Several Promises**
Phase Technologies, in collaboration with Rutgers Univ. and Bell Laboratories, is working on tiny batteries that can hold their charge much longer than today's cells, and could be integrated directly into a circuit board rather than connected by wires. "This is something small, less than postage-stamp size that could be integrated into the same piece of silicon that is housing the electronics," according to Ron Durando, CEO of mPhase. Foresight Institute believes that the work might lead to batteries with a 20-year shelf life. The technology is based on a material called "nanograss", developed at Bell Labs, which permits the control of the interaction of electrolytes within the battery. (September 2005) Ref. 518

**New Promises for Flexible Solar Cells**
Researchers at Wake Forest University's Center for Nanotechnology and Molecular Materials have developed an organic solar cell technology (cells are as thin as a coat of paint) with almost 6% efficiency in turning sunlight into useful electrical power. The new technology might be available to consumers in about five years. [See related item *Flexible Plastic Solar Cells Converting 30% of Sun's Power into Usable Energy* in January 2005 environmental security report] (November 2005) Ref. 519

**Flexible Plastic Solar Cells Converting 30% of Sun’s Power into Usable Energy**
Researchers at the University of Toronto, Canada have invented an infrared-sensitive material that could turn the sun's power into electrical energy at 5 times higher efficiency than present methods. This flexible plastic solar cell harnesses infrared light from the sun (half of the sun’s spectrum not previously accessed) and forms a flexible film on the surface of cloth, paper or other materials, becoming a ‘portable’ energy source. (January 2005) Ref. 520

**Flexible Solar Cells could be sewn in Clothing**
A European Union research project called H-Alpha Solar has developed light, flexible solar panels that could be sewn on fabrics and placed on surfaces to charge objects such as cell phones. When in full production, it is estimated to cost about 1 euro ($1.34) per watt. (December 2004) Ref. 521

**New Environmental-friendly Lighting Based on Gallium Nitride**
Prof. Colin Humphreys from Cambridge University, UK, is developing gallium nitride-based light bulbs that could last 100 times longer than light bulbs used today. Scientists agree that using gallium nitride in light-emitting diodes (LEDs) could help cut emissions of carbon dioxide and other greenhouse gases by 15%. While different nitride-based LED applications could soon materialize, it might take 5-10 years to develop the technology to produce gallium nitride LEDs with an acceptably white light for home and office lighting. Since lighting accounts for 20% of electricity use in developed countries and 40% in developing ones, the financial and environmental savings could be considerable. (May 2005) Ref. 522

**Light Emitting Diodes Offer Big Environmental Advantages**
A recent paper in the special energy issue of Optics Express summarizes the tremendous
environmental advantages LEDs offer over other lighting means, and predicts “a revolution in energy-efficient, environmentally-sound, and powerfully-flexible lighting”. They are 5 to 20 times as energy-efficient as other light sources, and their manufacture does not use toxic materials such as mercury. They also offer controllable color and polarization. Researchers in materials science and engineering at the University of Florida produced organic LEDs in various colors that achieve efficiencies of 50 lumens/watt (with hopes for 100 lumens/w or higher, eventually). (December 2008) Ref. 523

**New Technique Provides Cheaper LEDs**
A team at Cambridge University, led by Colin Humphrey, has developed a new production technique for gallium nitride LEDs that allows them to be grown on a silicon wafer and brings their price down to levels competitive with other types of light sources. [See *Light Emitting Diodes Offer Big Environmental Advantages* in December 2008 environmental security report.] (January 2009) Ref. 524]
**SPACE TECHNOLOGY**

**Increased Use of Space Technology for Monitoring Environmental Events**

**Greenhouse Gas Observing Satellite Could Help Enforcing Environmental Regulations**

**Space Technology for Environmental Security**

**Space-Based Services for Improving Emergency Response**

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**Satellite Technology Use for Environmental-related Issues Expands**

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**European Space Agency (ESA) UrbEx used to track urban 'hot spots'**

**International Atomic Energy Agency (IAEA) Inspectors Use Satellite Feeds to Track Sensitive Nuclear Materials**

**Improved Satellite Climate Change Monitoring**

**India to Set Up Military Surveillance and Reconnaissance System by 2007**

**Increased Use of Space Technology for Monitoring Environmental Events**

Kopernikus is the new name of the European joint earth observation system GMES (Global Monitoring for Environment and Security). In addition to monitoring environmental events, Kopernikus will enhance people’s safety by providing early warnings of natural disasters and a basis of enhanced modeling activities to help better understand the drivers of climate change. The EU 5th Space Council adopted a Resolution on the priorities of Galileo and Kopernikus programs, while the Space Council highlighted the need to improve the coordination between civil and defense programs, and noted the intention of ESA’s Director General to submit a proposal for a program on Space Situational Awareness to set the basis towards the development of a European capability for monitoring European space infrastructure and of space debris. Chinese officials say they have launched their first two natural disaster and environment monitoring satellites.

A report by the U.S. Climate Change Science Program concluded that the utilization of Earth science information to manage resources and protect public health should improve. (September 2008) Ref. 525

**Greenhouse Gas Observing Satellite Could Help Enforcing Environmental Regulations**

Japanese Greenhouse Gases Observing Satellite "IBUKI" (meaning “breath”) is the world’s first satellite dedicated to monitoring greenhouse gas emissions. It circles the earth every 100 minutes and monitors the levels of CO2 and methane at 56,000 observation points. The data should help the global effort to understand and combat global warming. (January 2009) Ref. 526

**Space Technology for Environmental Security**

The 2007 ESA Envisat Symposium discussed how ESA (European Space Agency) satellites could improve understanding of the carbon cycle and thus advance climate change forecasting, improve decisionmaking, and also improve monitoring of international treaties aimed at reducing greenhouse gas emissions, such as the Kyoto Protocol. Special sessions were dedicated to the
Global Monitoring for Environment and Security (GMES) program, and use of Earth observation satellites in support of international environmental conventions. Prior to the Symposium a high-level conference was held: “The Way to the European Earth Observation System GMES—Munich Roadmap” regarding the first GEMES services, the Commission’s proposal for GEMES long-term sustainability, and the proposal for adoption by the Council and implementation of the first generation of GMES-dedicated satellites. GMES is also a key part of the new European Space Policy adopted by the European Commission, to be presented for discussion and endorsement to the Space Council on 22 May 2007. [See also Space Technology for Improving Planetary Knowledge and Security, Space Technology to Help Enforce Environmental Regulations in November and Climate Change--Improved Satellite Climate Change Monitoring and other related items.] (April 2007) Ref. 527

Space-Based Services for Improving Emergency Response
The Health Early Warning System will improve warning and emergency response in case of natural disasters and pandemics by using satellite communication. HEWS consists of a communication network via satellite to survey and monitor risk indicators. It is connecting end-user relieve agencies with command centers, provides wide, real-time perspective of the events and knowledge related to the threat, and helps with logistical support, thus improving the emergency effort efficiency. HEWS is an open platform, widely implementable. Another European initiative, Eurisy programme dedicated to Local and Regional Authorities, aims to help end-user communities understand how space technology-based tools can help them in some complex activities such as monitoring environment matters, handling natural disaster, and e-Government. The Conference “Future Challenges for Local and Regional Authorities: How can Space Technology help?” held May 29-30 in Barcelona, is the first event of Eurisy’s 3-year programme. The China National Space Administration joined on May 24, 2007, the International Charter “Space and Major Disasters,” an international network of international, private and government space agencies that aims to provide satellite data free of charge in emergency situations to those affected by disasters anywhere in the world. At the Pan African Parliament’s (PAP) Seventh Ordinary Session held in May 2007, delegates recommended increased international cooperation in scientific and technological research, including the use of space tools to help decision-making related to fight against desertification and climate change. (May 2007) Ref. 528

Space Technology to Help Enforce Environmental Regulations
Space observations have become a major tool for monitoring environmental change, helping policy making, developing adequate strategies, and assisting enforcing environment-related regulations. The European Space Agency (ESA) is participating in the climate change summit in Montreal, to share results from satellite-based forest mapping services developed to support the Kyoto Protocol. Another ESA project, Globwetland, supports the Ramsar Convention on Wetlands by developing a global wetland information service using satellites. ESA's project called CONTRAILS is a satellite-based service to monitor daily contrail and cirrus cloud generation by airplanes over Europe and the North Atlantic for a detailed assessment of the greenhouse impact of aviation-induced contrails. The project results are expected at the beginning of 2006. ESA and the EC Joint Research Centre (JRC) signed an agreement of cooperation for using Earth Observation data in support of the information services of the EU. This will enhance the policy support role of the Global Monitoring for Environment and Security
system. [See also Climate Change—Improved Satellite Climate Change Monitoring in June 2005 and other related items on the same issue in previous environmental security reports.] (November 2005) Ref. 529

**Satellite Technology Use for Environmental-related Issues Expands**  
Following the adoption of the Global Monitoring for Environment and Security (GMES) Declaration by the ESA Ministerial Council, December 5-6 2005, new EU Member States can now be formally involved in the program. The ESA Council also reinforced full support for the GMES Program, which aims to provide the public and policy- and decision-makers essential strategic environmental and civil security information based on operational and integrated space, air, ground, and sea observations. The possible applications would include—but not be limited to—environmental monitoring, risk management and early warning, and climate and weather forecasting. GMES should deliver its first operational Service Elements in 2008. As pointed out at the UN Climate Change Conference in Montreal, satellite technology could also play an increasing role in the efforts for monitoring greenhouse gas emission and developing new mechanisms to combat global warming. [See also Space Technology to Help Enforce Environmental Regulations in November and Climate Change—Improved Satellite Climate Change Monitoring in June 2005 and other related items on the same issue in previous environmental security reports.] (December 2006) Ref. 530

**Space Technology for Improving Planetary Knowledge and Security**  
Over 8000 scientists convened in Vienna, Austria, April 3–7 for the third annual European Geosciences Union (EGU) General Assembly. The discussions through the 400 thematic sessions revealed the importance of space technology in contemporary planetary sciences. Prominent subjects included changes in CO2 levels and their impact on biodiversity; the use of satellite technology in enhancing weather predictions; greater understanding of polar ice loss; deep sea research using marine mammals; the use of solar-powered robots for polar research; and satellite altimetry to predict sea level change and predict its impacts. [See the Appendix for more details on the issues discussed at the EGU General Assembly] Space technology proves to be of great help in monitoring present flooding in Europe and world population mapping, increasing timely and more efficient response. NASA’s CloudSat and CALIPSO research satellites launched this month will help scientists refine computer models that forecast the weather and chart global climate change. [See also Satellite Technology Use for Environmental-related Issues Expands in December 2005, Space Technology to Help Enforce Environmental Regulations in November and Climate Change—Improved Satellite Climate Change Monitoring in June 2005 and other related items on the same issue in previous environmental security reports.] (April 2006) Ref. 531

**European Space Agency (ESA) UrbEx used to tag urban 'hot spots'**  
As part of ESA's Data User Programme aimed at finding innovative, operational applications of Earth observation data to solve environmental and other problems, ESA Urban Expansion (UrbEx) project worked with WWF Italia for monitoring the urbanization of the Italian coast to catch overdeveloped 'hot spots'. In addition to demonstrating the capability to monitor urban growth using Earth observation information, the project included the development of an imagery database and analytical tools to assess the growth of urbanization and its impact on natural resources. (May 2003) Ref.: 532
International Atomic Energy Agency (IAEA) Inspectors Use Satellite Feeds to Track Sensitive Nuclear Materials

IAEA is building a global network for monitoring nuclear facilities by using direct satellite information. This will enhance the possibility of real-time tracking of sensitive nuclear materials and checking that they are not being diverted for non-peaceful use. The first field trial connecting a nuclear power plant in Slovakia to IAEA headquarters started in April this year and the results of the feasibility study for a prospective global system are expected by the end of the year. IAEA will be working with the European Space Agency on the system. (July 2005) Ref. 533

Improved Satellite Climate Change Monitoring

The UK's National Physical Laboratory designed the first unmanned probe able to calibrate its instruments in orbit, Traceable Radiometry Underpinning Terrestrial and Helio Studies (TRUTHS). This will reduce the margin of error and be able to supply more accurate satellite data, thus improving climate change parameter monitoring and helping settle international disputes over greenhouse gas emissions and strategies to curb global warming; e.g., carbon trading. [See also Global Earth Observing System of Systems (GEOSS) Gets 10-Year Mandate in February 2005, and Improved coordination of global Earth observation in August 2003 environmental security reports.] (June 2005) Ref. 534

India to Set Up Military Surveillance and Reconnaissance System by 2007

Indian Defence Minister Pranab Mukherjee recently declared that India’s satellite-based Military Surveillance and Reconnaissance (SBS) System that was supposed to be operational this year, is now in an advanced stage of development and will begin functioning by 2007. (August 2005) Ref. 535

Technologies that Could Trigger New Forms of Arms Race

Modern Warfare Increasingly Harmful to the Environment

Future Proliferation of Autonomous Ground and Air Robot Weapons

Accelerating Synthetic Biology Applications Need Better Monitoring and Regulation

Technology and Biological Weapons: Future Threats--Report

SIPRI 2004 Yearbook Warns about Genetic Weapons

Future Computer-Human Interface Means Cyber Viruses Could Infect Humans

Futuristic Nanotech and Synthetic Bioweapons Regulations

Weather modification technologies

Chinese Use of Weather Modification Technologies Might Cause Disputes

Nanobacteria in Clouds could Spread Disease

The Human Epigenome Project

Laser Technology (solid-state and chemical lasers) used in destructive engagements

Gamma-Ray Weapons would be capable of killing any living thing in the immediate area and any undetonated isomer could be a somewhat "dirty" bomb

Bioweapons are already possible to make, says new CIA report
Artificial virus that could lead to a new life form was created
New lethal viruses development
Tree Pathogens
A new Biodefense Agency within the Office of the Secretary of the U.S. Department of Defense suggested

**Modern Warfare Increasingly Harmful to the Environment**

War and the environment, an article published by Worldwatch Institute, shows that modern warfare tactics have an increasingly devastating impact on the ecosystems. By thoroughly analyzing the ecological effect of the American war in Vietnam, the Rwandan and Congolese civil wars, and the current war in Iraq, the article illustrates the long-term damage caused by modern “ecocide.” [See also *Addressing Post-Conflict Environmental Security Issues* in August 2006, and other similar items in previous environmental security reports.] (December 2007) Ref.536

**Future Proliferation of Autonomous Ground and Air Robot Weapons**

Although today's robotic weapon systems include humans in decisionmaking, future autonomous systems may be developed by major military powers to act without human intervention. This technology could be relatively easy to build and at relatively low costs, making proliferation possible. One robotics expert has called on national governments and the international community to assess these risks and seek controls before they become more commonly available. (February 2008) Ref.537

**Accelerating Synthetic Biology Applications Need Better Monitoring and Regulation**

Recently, there were some significant synthetic biology advances, such as the Genome transplant by the J. Craig Venter Institute (transforming one type of bacterium into another by transplanting of donor chromosome into the host), and MIT and Boston University built viruses to combat harmful 'biofilms' (see item 5.2 above). These developments increased the discourse around security issues related to synthetic biology, thus intensifying the regulations debate. International treaties such as the Convention on Biological Diversity might need to be revised in view of the new synthetic biology field. Along the same line, the International Consortium for Polynucleotide Synthesis appeals for improved regulation and surveillance of DNA synthesis products. They propose an oversight framework to improve biosecurity in the gene-synthesis sector, to prevent ill-intentioned individuals from accessing and using such materials. [See also *Futuristic Nanotech and Synthetic Bioweapons Regulation* in November 2006 and *ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations* in January 2007 environmental security reports.] (July 2007) Ref.538

**Technology and Biological Weapons: Future Threats**

*Technology and Biological Weapons: Future Threats*, a report published by Bradford University, UK, is an overview of present biological warfare possibilities, with case studies and possible future threats involving the vulnerability of the immune system. The report analyses the possible dual use of research in the area in order to show potential misuses. It finally shows that all biotechnology and bioinformatics areas discussed in the paper are of particular concern for the future for both promoting and combating biological warfare. The authors warn that if governments do not act fast enough, then one day, “… it will be virtually impossible to defend
ourselves.” (October 2004) Ref. 539

SIPRI 2004 Yearbook Warns about Genetic Weapons
The annual yearbook of the Stockholm International Peace Research Institute includes a warning of the potential for new classes of biological weapons. (June 2004) Ref. 540

Future Computer-Human Interface Means Cyber Viruses Could Infect Humans
As the human-computer interface continues to evolve into a continuum, it is reasonable to assume cyber viruses will one day be able to transfer into electronic components that will have been added into the human nervous system, and so have biological effects. Kevin Warwick, professor of cybernetics at Reading University, and a cyborg pioneer, warned that the emergence of computer-human connection and the production of synthetic viruses comes with great advantages, but also a huge risk: computer viruses will be able to infect augmented humans as they do PCs. (November 2004) Ref. 541

Futuristic Nanotech and Synthetic Bioweapons Regulation
With the forthcoming ability to write genetic code to create new kinds of life forms from scratch, opening a vast potential for new kinds of synthetic bioweapons, a new regulatory environment should be considered. These developments, along with potentials for nanotech weapons, create unique problems of proliferation, health effects, environmental impacts, and post-conflict cleanups that are not well covered by international treaties. It seems inevitable that treaties governing such futuristic weapons – like treaties that were created for other kinds of weapons in the past – will be negotiated. The factors that make such weapons possible (such as improved computer chips, increased bandwidth, software, nano-engineering) are producing synergistic improvements at an accelerating pace. This makes their speed of development faster than might have been expected. (November 2006) Ref. 542

Weather modification technologies
Over the last 30 years, US research on weather modification has dwindled, and only a handful of research programs exist in other countries. Over this period, atmospheric science has made significant advances, but because weather-modification research has not kept pace, these advances have not been applied in any coherent or sustained way. The National Research Council has published a report calling for a coordinated, sustained national program to answer fundamental questions about basic atmospheric processes and address other issues that are impeding progress in weather modification. (October 2003) Ref. 543

Chinese Use of Weather Modification Technologies Might Cause Disputes
Severe droughts in China, particularly in major cities in the central Henan province, led Chinese authorities to the use of weather modification technologies to produce rain. The bombardment of clouds in one area provoked discontent in the neighboring ones who claimed a loss of moisture. (July 2004) Ref. 544

Nanobacteria in Clouds could Spread Disease
Nanobacteria in clouds could become pathogenic airborne contaminants. They could play a crucial role in the spread of disease and in the formation of rain drops, according to Dr Andrei P. Sommer of the University of Ulm, Germany, and Professor Chandra Wickramasinghe of Cardiff
University, UK. Nanobacteria are microorganisms 100 times smaller than ordinary bacteria and can self-replicate. The wind can blow disease-carrying nanobacteria from the ground all the way to the stratosphere where they can oscillate between dormant and active states, as they move between high and low-humidity regions in clouds and then return to different areas on the earth via rain. (April 2005) Ref. 545

**The Human Epigenome Project could lead to a potential genetics arms race**
The world's first project to map key chemical changes that switch human genes on and off has begun. The Human Epigenome Project follows the completion of the Human Genome Project and aims to map the way methyl groups are added to DNA across the entire human genome. These "epigenetic" changes are believed to turn genes on and off. There is evidence that the methylation pattern of genes is altered in certain tumors. Methylation is a natural process that mainly occurs on cytosine, one of the four bases that make up DNA. When a methyl group is added on to cytosine in the promoter region of a gene - the sequence that causes it to be expressed - the gene is switched off. (October 2003) Ref.546

**Laser Technology (solid-state and chemical lasers) used in destructive engagements**
Advances in laser technology may make a functional general-purpose laser weapon system available for fielding within a decade. Three major technology streams are being pursued: chemical lasers, free-electron lasers, and solid-state lasers. With numerous government and private sector research labs pursuing the goal of building battlefield lasers, it is no longer a question of if but when they will be fielded. (November 2003) Ref.547

**Gamma-Ray Weapons would be capable of killing any living thing in the immediate area and any undetonated isomer could be a somewhat "dirty" bomb**
An explosive being developed by the US Department of Defense could blur the critical distinction between conventional and nuclear weapons. The work has also raised fears that weapons based on this technology could trigger the next arms race. The explosive works by stimulating the release of energy from the nuclei of certain elements such as hafnium but does not involve nuclear fission or fusion. The energy, emitted as gamma radiation, is thousands of times greater than that from conventional chemical explosives. One gram of hafnium isomer could store more energy than 50 kilograms of TNT. The effect of a nuclear-isomer explosion would be to release high-energy gamma rays capable of killing any living thing in the immediate area. It would cause little fallout compared to a fission explosion, but any undetonated isomer would be dispersed as small radioactive particles, making it a somewhat "dirty" bomb. This material could cause long-term health problems for anybody who inhaled it. The current forecast for producing militarily significant quantities is five years. (August-September 2003) Ref.548

**Bioweapons are already possible to make, says new CIA report**
A CIA scientific advisory panel has produced a report that indicates advanced bioweapons are already possible to make. The recent Australian and American mousepox virus manipulation is one example of the use of techniques that could be applied to anthrax, smallpox, or other potential biological agents. The report also brings up the possibility of designer diseases that would be immune to treatment, or that would linger inactivated in the body until the passage of a certain amount of time or until a specified second substance had entered the body. The panel proposed developing defenses aimed at strengthening the body's resistance to all disease, rather
than creating treatments for individual diseases. (November 2003) Ref.549

**Artificial virus that could lead to a new life form was created**
The Institute of Biological Energy Alternatives in Rockville MD has created a wholly artificial virus and claims that it could lead to a new life form. This synthetic bacteria-scale organism was produced using oligonucleotides (single-stranded DNA fragments) and an adaptation of the commonly used polymerase chain reaction (PCR) technique - the polymerase cycle assembly (PCA) method. Although an artificial virus has been created before, this is the first time one has been constructed to genetically match an existing organism. The researchers suggest that it can be engineered to produce clean energy or clean up pollution. If so, then future modification to environmental treaties could follow, especially as pressures noted in Item 1 of this report continue to increase. (November 2003) Ref.550

**New lethal viruses development**
A new form of extremely deadly mousepox, a relative of the smallpox virus, has been deliberately created through genetic engineering. The new form of virus kills all mice and is resistant to antiviral drugs and the vaccine that would normally have protected the subjects. In a similar way, cowpox virus (which infects a range of animals including humans) was also altered, as was rabbitpox. Although these modified viruses are not contagious, there is no guarantee that other poxviruses modified in a similar way would also be non-contagious. These researches reveal once more that bioterrorists could use similar techniques to modify a poxvirus that infects humans. (November 2003) Ref.551

**Military Introduction of Tree Pathogens in Italy**
Researchers at the University of California, Berkeley, and in Italy, have shown the origin of a tree pathogen threatening Italian pine trees to be the US Army units that occupied the area 60 years ago. "This study suggests that when planning military operations abroad, there is a need, and a responsibility, to check for potential micro-organisms that could be introduced to foreign lands, and to take measures to prevent them from spreading." The research in Italy supports a common suspicion among plant pathologists in Europe that certain diseases in that region are linked to US Army bases. Although there does appear to be a correlation, there is no proof yet that other US bases are the cause of similar tree die-offs elsewhere in Europe. (April 2004) Ref.552

**A new Biodefense Agency within the Office of the Secretary of the U.S. Department of Defense suggested by the Institute of Medicine and the National Research Council**
The issues about how to handle the problems of genetically modified viruses and pathogenic chimeras (artificially created hybrids of disease-causing organisms), in particular those related to smallpox rose on the agenda of the scientific and health communities (including the WHO). The WHO's committee on smallpox research is currently weighing various proposals for new and continuing experimental efforts, including some based at CDC and US Army Medical Research Institute of Infectious Diseases (AMRIID). It is likely that the discussions on bio-safety/biodefense will soon move from the health and research committees to wider international legislative bodies triggering new Protocols to existing treaties (i.e. Biologic and Toxic Weapons Convention) or even new international treaties dealing with genetic manipulation and its hazards. (January 2004) Ref.553
B. Preventing or Responding to Environmentally Caused Conflicts

Increasingly scarce resources, climate change, biofuels, and growing population and higher living standards are all contributing to the long-term rise of food prices. In 2007, dairy prices rose nearly 80% and grain 42%. If this trend continues, the number of people facing famine or malnutrition is expected to grow from at least 850 million today to 1 billion, increasing instability. Food riots have already occurred in some 30 countries, including recently conflict-torn nations such as Haiti, Côte d’Ivoire, Senegal, and Somalia. Meantime, a few agricultural biotechnology companies are trying to concentrate corporate power and gain monopoly over a large part of global food, in some cases undermining agricultural productivity and jeopardizing national food security. With nearly 3 billion people making $2 or less per day, long-term global social conflict seems inevitable without more serious food policies, scientific breakthroughs, and dietary changes. A new UN Task Force on the Global Food Crisis was designated to prepare a comprehensive plan of action to tackle the rise in food prices.

The UN, OSCE, and NATO are paying increasing attention to environmental security. The UN Security Council debated the relationship of security and the environment for the first time in history in April 2007 and more recently acknowledged that the UN should move from a culture of “reaction” to one of conflict “prevention” and should develop potential tension detection mechanisms. The OSCE adopted a Ministerial Declaration on Environment and Security, and the NATO Security Science Forum on Environmental Security addressed the security implications of environmental issues, forecasting, and cooperation with other international organizations.

The number of weather-related disasters worldwide now averages 400–500 a year compared with 125 in the early 1980s. The number of people affected by natural disasters in 2007 reached 200 million. The UN notes that seven times more livelihoods have been devastated by natural disasters than by war worldwide, and this is likely going to be worsening due to climate change. The intensity of Atlantic storms has nearly doubled over the last 30 years, and computer models show a direct link between climate change and the strength of storms. Some officials say that climate change should be addressed like World War III.

Most of the countries with the highest birth rates are those already affected by the world’s worst wars. Growing pressure of people on land and resources is likely to exacerbate conflict in those areas. Semiarid areas of sub-Saharan Africa with some of the highest concentrations of poverty in the world face potential productivity losses of 25% by 2060.

By 2050, some 250 million people could be permanently displaced by climate change–related phenomena. UNHCR remarks that after several years of decline, the number of refugees began rising again. Without a legal framework to address environmental refugees’ situation, their rights will not be addressed and conflicts will be difficult to avoid.

The Climate Change and International Security paper to the European Council notes that the “impact of climate change on international security is not a problem of the future but already of today and one which will stay with us” and underlines that the European Security Strategy and related proposals “should take account of the security dimension of climate change.”
SECURITY IMPLICATIONS OF CLIMATE CHANGE

Global Security linked to Climate Change
“Violence within and between communities and between nation states, we must accept, could possibly increase, because the precedents are all around”, warned Sir Crispin Tickell, Britain's former ambassador to the UN at the recent London conference, Climate Change: the Global Security Impact, hosted by the Royal United Services Institute. Security and climate experts assessed the impact of global warming on world security, noting again that in many cases, climate change consequences happen in already conflict-torn regions. Poverty and despair will increase as millions of people around the world are threatened by desertification, poor fresh water conditions, and rising sea levels. Unless global efforts to accommodate these people increase, the risk of conflict and terrorism grows. At the Economic Forum of Davos, there was a workshop on climate change and security, where panelists discussed the undeniable consequences of climate change on global security. (January 2007) Ref.554

International Conference on Military’s Role in Climate Change
The Importance of Military Organizations in Protecting the Climate 2008 conference, attended by over 100 military and environmental experts from 25 countries, plus the EU and UNEP, discussed the security implications of climate change and the role of the military community in addressing it. There was consensus that climate change is a conflict multiplier with global security implications such as: “creating new geopolitical areas of concern; inhibiting the ability to project power; jeopardizing coalition partnerships; increasing operations other than war; overloading UN peacekeeping deployments; and requiring urgent actions by military and civilian leaders and the public”4. Therefore military organizations should increase their role in protecting the climate by showing leadership in increasing energy efficiency through procurement and operations, R&D centers of excellence, and transfer of knowledge. Several best practices were discussed and a project was proposed for a global public-private partnership to cooperate in efforts to collect and destroy ozone-depleting substances. Some “visionary military climate strategies” included “self-sustaining energy at the battlefront; a Carbon Non-Proliferation Treaty; and cooperation on Arctic passage & resources”5. The conference, which is the fifth in a series that began in 1991, was held in Paris, November 3-5, co-hosted by the Institute for Governance and Sustainable Development and collaborators. (November 2008) Ref.555

Economic and Security Implications of Climate Change
The Economics of Climate Change, an authoritative report by Sir Nicholas Stern, former chief economist with the World Bank, warns that unless rapid action is taken globally to reduce emissions and tackle climate change within a decade, the world will face deep economic recession, with annual costs of climate change consequences ranging between 5% to 20% of the global economic output (about £3.68 trillion--approx. $7 trillion US dollars). The report calls for a global framework on climate change that is flexible—considering different countries'/regions' specifics. Another report, Africa—Up in Smoke 2, by a coalition of UK aid agencies and environmental groups warns that climate change might annihilate efforts to tackle poverty in

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5 Ibid.
Africa and emphasizes the need for human progress and development models that are climate-proof and climate friendly. Africa is already 0.5°C warmer than it was 100 years ago and temperature increases over many areas of Africa might be double the global average increase, worsening drought patterns and the strain on already feeble water resources, and therefore aggravating the security situation of the conflict-torn continent. As noted by UK Foreign Secretary, Margaret Beckett, climate change is not any longer just an environmental problem, but is “a defence problem. It is a problem for those who deal with economics and development, conflict prevention, agriculture, finance, housing, transport, innovation, trade and health.” (October 2006) Ref.556

**International Conferences Put Climate Change among Top Security Issues**

Experts and politicians participating at a seminar on climate change held in Ny Alesund, Norway, called climate change the biggest security challenge since the Cold War. British climate change ambassador John Ashton said global warming should be considered a security issue on a par with terrorism, in order to increase global action to cut greenhouse gas emissions from fossil fuels.

“Already seven times more livelihoods are devastated by natural disasters than by war worldwide, at the moment, and this is going to be much worse, the way the climate is developing,” noted Jan Egeland, special adviser on conflict prevention to UN Secretary-General Ban Ki-moon, and former head of UN humanitarian affairs. He underlined again that “those most affected by climate change are the poorest since droughts and flooding will be getting worse.” The Vienna climate change talks organized by the UN Framework Convention on Climate Change this month and attended by about 1,000 politicians, experts, activists, and representatives from the media from over 150 countries give equal importance to adaptation and mitigation. [See also UN General Assembly 61st Session Pinpoints Global Warming as a Central Issue for Security in September 2006 and UK Initiates UN Security Council Debate on Climate Change and Security in April 2007 environmental security reports] (August 2007) Ref.557

**Increased Role of the Military in Environment-related Crises**

Senior security policy-makers from 27 countries attended this year’s Shangri-La Dialogue in Singapore May 30–June 1, 2008 to improve military anticipation and response to natural disasters such as those of last year in Bangladesh and this year in Myanmar. Ministers from ASEAN recognized that diverging views on military involvement should be addressed. A French politician suggested that a system of sanctions should be established to “stop this scandal of having hundreds of thousands of people dying with help waiting outside and having a lecture about non-interference in domestic affairs,” and that he will advise the French government to propose that Myanmar government be held liable before the International Criminal Court. Singapore’s Prime Minister Lee Hsien Loong made a few recommendations for addressing climate change, including establishing a ‘technology transfer board’ for helping the LDCs, and an International Food Fund to address food security. “Between countries, competition for food supplies and displacement of people across borders could deepen tensions, and provoke conflict and wars” he said. (June 2008) Ref.558

**UN General Assembly Stressed Environment-related Issues**

The issues most frequently mentioned by heads of state and governments at the 63rd session of the UN General Assembly were the global food crisis, impacts of climate change, widespread
hunger and poverty, access to water, nuclear control and disarmament, human rights, and terrorism. Ukraine suggested the development of a World Environmental Constitution as a binding framework agreement, and the establishment of a UN entity with authority for ecological protection. Mexico proposed a UN-managed Green Fund to help poor nations cope with the effects of climate change. Small island developing nations that are under imminent threat due to rising sea levels appealed for measures to ensure their survival and the Pacific Islands Forum will resubmit a resolution asking the Security Council to investigate the peace and security implications of global warming, although Solomon Islands’ Prime Minister Derek Sikua expressed fears that the magnitude of climate change has already outgrown the existing capacity of the UN system to respond. (September 2008) Ref.559

**IISS’s Strategic Survey 2007 Warns of Global Security Implications of Climate Change**

Strategic Survey 2007 by the International Institute for Strategic Studies (IISS) is a comprehensive analysis of the world security situation in general and by region. The “Strategy Policy Issues” chapter includes ‘Climate Change: Security Implications and Regional Impacts’ and ‘The Military Use of Space’. The report lists the effects of climate change and nuclear proliferation as being on a par with growing Islamist extremism as the biggest security threats. It warns that “Even if effective measures are adopted, there will still be unavoidable impacts on the environment, economies and human security”; and, unless the right preparedness actions are taken, global security consequences of climate change could be equal in disruption to those of nuclear war. (September 2007) Ref.560

**Twenty Years of Environmental Security**

*An Uncommon Peace: Environment, Development, and the Global Security Agenda* by Geoffrey D. Dabelko, ECSP Director, published on the 20th anniversary of *Our Common Future* (commonly known as the Brundtland report) is an assessment of the evolution of our understanding of environmental concerns with implications for national and international security. It addresses changes in the traditional state-centered approach to new security threats such as: the possible environmental consequences of nuclear war replaced by the increased threat of dirty bombs; new threats such as genetic mutations; and health and poverty. Dabelko notes that these new realities outline the pathway to “one facet of our common future: environmental peacemaking.” (May 2008) Ref.561

**National Security Implications of Global Climate Change Through 2030**

*National Security Implications of Global Climate Change Through 2030* by the National Intelligence Council, is an assessment of climate change security implication for the US in the next 20 years. It is a comprehensive assessment of the impact of climate change in different parts of the world and the possible political instabilities, mass movements of refugees, terrorism, or conflicts over water and other resources in specific countries. The next effort is a scenario exercise and the third effort will be to explore the geopolitics of climate change and how that may shift the relationships between major powers. NIC’s Global Trends out to 2025 is expected to be published in December 2008. (June 2008) Ref.562

**Global Trends 2025: A Transformed World**

*Global Trends 2025: A Transformed World* by the US National Intelligence Council is an analysis of threats to security and potential geopolitical developments. It features four scenarios:
“A World Without the West”; “October Surprises”; “BRICS’s Bust-up”; and “Politics is not Always Local.” It includes a chapter on “The Demographics of Discord” (chapter 2), as well as a section on “Water, Food, and Climate Change” (in chapter 4: “Scarcity in the Midst of Plenty?”) (November 2008) Ref. 563

Climate Change Impacts Assessment on U.S. National Security
Assessment of Select Climate Change Impacts on U.S. National Security by the Center for International Earth Science Information Network (CIESIN) of Columbia University is a paper in reaction to the National Security Implications of Global Climate Change Through 2030 produced by the National Intelligence Council [see the respective item in the June 2008 environmental security report.] This extremely well-documented and illustrated paper identifies the countries at high potential security risk by examining and quantifying the security implications in three specific domains: global sea level rise, temperature change, and water scarcity. The aggregate vulnerability index takes into account a nation’s respective climate change aspect and adaptability capacity. As to sea level rise, the most vulnerable are highly populated, low-elevation coastal zones in China, India, Indonesia, Philippines, and Egypt. The countries identified as presenting high instability risk due to temperature change are South Africa, Nepal, Morocco, Bangladesh, Tunisia, Paraguay, Yemen, Sudan and Côte d’Ivoire, while water scarcity might possibly increase instability in Mozambique, Côte d’Ivoire, Nigeria, Iraq, Guatemala, Zimbabwe, Ethiopia, Somalia, China, Syria and Algeria. The paper makes some recommendations on strategies and policies that might help overcome and mitigate eventual threats. (July-August 2008) Ref. 564

Arab Mediterranean Governments’ Environmental Security Cooperation
The Environmental Security in the Arab and Mediterranean sphere: Role of the Civil Society conference was organized by the Association of the Mediterranean Network for Sustained Development (ARREMED) and the Arab Environment and Development Network (RAED), in Tunis. Attended by high-ranking diplomats and environment and security experts, the conference discussed cooperation and common policies for addressing environmental and human security in the Arab Mediterranean spheres. “Governments should unify policies on environmental security and strengthen partnership in matter of scientific research between Arab countries and prepare a survey of possible risks to evaluate their impact and their cost,” stipulates the conference declaration. Highlighted was that tackling environmental issues is imperative mainly in conflict-threatened regions. Along the same lines, the Arab Environment: Future Challenges report launched at the annual conference of the Arab Forum for Environment and Development held in Manama, Bahrain, recommends urgent action in four major areas: fresh water scarcity, desertification, air quality, and marine pollution, all of which will likely worsen due to climate change. (November 2008) Ref.565

Water and Environmental Research Center to Be Established in UAE
The UAE University in Abu Dhabi has been funded to create a Water Environment Centre of Excellence. The research generated will be published, contributing to solving water- and environment-related problems in the UAE as well as in neighboring countries. Mohsin Al Sharif, head of the new center, said that one of the objectives is also to review UAE water-related policies. (December 2008) Ref. 566]
Global Climate Risk Index 2008

*Global Climate Risk Index 2008 Weather-Related Loss Events and Their Impacts on Countries In 2006 And In A Longterm Comparison* by Sven Harmeling analyzes to what extent countries and country groups have been affected by the impacts of weather-related loss events (storms, floods, heat waves etc.) whereby losses are quantified using four indicators: 1) total number of deaths; 2) deaths per 100,000 inhabitants; 3) absolute losses in million US$ PPP (purchasing power parity; and 4) losses per unit GDP. These analyses are based on assessments of the Munich Re database NatCatSERVICE®. The Global Climate Risk Index 2008 was published by Germanwatch, an independent NGO, with financial support from the German Federal Ministry for Economic Cooperation and Development (BMZ). (July-August 2008) Ref.567

Tools for Addressing Humanity’s Growing Ecological Footprint

Earth Overshoot Day this year was on September 23 and is moving forward each year, notes Global Footprint Network. In 2008, humanity used about 40% more than nature can regenerate resources and absorb waste. The Living Planet Report 2008, which documents the extent of human pressure on the planet, reveals that 75% of the human population lives in countries that are “ecological debtors,” demanding more biocapacity than they have within their borders. According to UN moderate projections, by the mid-2030s we will need the equivalent of two Earths to support us. The Ecological Footprint Atlas 2008 offers country-by-country graphs, data tables, and sources, representing a valuable tool to help manage our ecological assets. Conservation International is launching a new environmental protection resource, the Integrated Biodiversity Assessment Tool (http://biodiversityinfo.org/ibat/), which will provide a centralized source from which organizations can obtain comprehensive information on their possible ecological impacts. (October 2008) Ref.568

miniAtlas of Human Security

The miniAtlas of Human Security, produced by the Human Security Report Project at Simon Fraser University, Canada, is a comprehensive illustrated guide of global and regional trends in human insecurity—with details on: armed conflicts, genocides and other forms of deadly violence against civilians; fatalities from political violence; numbers of refugees and other displaced peoples; and respect for human rights. (October 2008) Ref.569

GEO-4

UNEP’s fourth *Global Environment Outlook: environment for development* (GEO-4) warns once more that changing temperatures, rapid rates of species’ extinction, and unsustainable depletion of the world’s scarce resources are the most important threats to human survival. The report reiterates that in order to avoid catastrophe, a new proactive policy approach is needed, since environmental problems worsen faster then response policies are presently adopted. An analysis by region shows that in Africa, the biggest problem is caused by land degradation due to unsustainable use and climate change; in Asia and Pacific, despite improvements in many domains, the environment is further threatened by increasing consumption and associated waste—including hazardous waste; Europe, although a leader in environmental policy, has to make greater efforts to reduce greenhouse gas emissions and change its unsustainable patterns of production and consumption; the Latin America and Caribbean environment is threatened by lack of land-use planning—including urbanization and deforestation, and high income inequality; in North America, high energy consumption and low efficiency, low fuel economy
standards, and urban sprawl are the main environmental problems. (October 2007) Ref.570

**World in Transition –Climate Change as a Security Risk**

*World in Transition –Climate Change as a Security Risk*, a report by the German Advisory Council on Global Change based on the work of international experts and organizations including the UN Environmental Program (UNEP), assesses the possible security implications of climate change and warns that inaction might lead to destabilization and raise the threats to international security to a new level. It suggests four 'climate-induced conflict constellations': 1) freshwater scarcity, 2) decline in food production, 3) increased natural disasters, and 4) environmentally-induced migration. The geographic areas at greater risk include: northern and southern Africa and the Sahel zone; central Asia, India, Pakistan and Bangladesh, China; Caribbean and the Gulf of Mexico (especially Central America); and Andean and Amazonian regions of Latin America. The report makes extensive recommendations, including: shaping global political change, reforming the UN, developing pro-active climate protection and adaptation policies, and “financing international conflict prevention.” It also underlines the need to develop strategies for avoiding destabilization and conflict in the event that climate protection fails. (December 2007) Ref.571

**Six places in the world where climate change could cause political turmoil**

A Christian Science Monitor article, *Six places in the world where climate change could cause political turmoil* gives another view of areas vulnerable to consequences of global warming: 1) Nepal (lack of freshwater due to melting glaciers causes migration and increased power of Maoists); 2) Indonesia (deforestation); 3) Lagos, Nigeria (sea-level rise in an overpopulated and unstable region); 4) U.S. (overstretched America's armed forces due to disaster relief and war-fighting); 5) Arctic (race for natural resources and navigation change sovereignty questions as Arctic ice melts); 6) East Africa (desertification and decreased food production induced migration). (December 2007) Ref.572

**An Uncertain Future: Law Enforcement, National Security and Climate Change**

*An Uncertain Future: Law Enforcement, National Security and Climate Change* is a comprehensive analysis of the security implications of climate change, including some recommendations. It warns that “traditional attempts to maintain the status quo and control insecurity” and use “military force to secure resources overseas, while attempting to create a fortress state at home” are doomed to failure. Mentioning “almost certain” future mass movement of 200 million people by 2050 due to climate change, the report calls for an international legal framework for environmental refugees’ management. Climate change has the potential to change the geographical and political world map and in addition to being a “threat multiplier” in already vulnerable areas like the Horn of Africa and the Persian Gulf, it could also cause civil unrest in developed countries of North America and Europe. Increased research is needed to identify areas of highest vulnerability and instability and to consider climate change in foreign aid programs. Military and police will have to change from reactive to proactive strategies in order to prevent and manage security issues triggered by climate change. Unrest could range from protests against polluting companies and government inaction to new forms of ecoterrorism (although the author considers the term misleading). Recommendations include changes in “Policing new legislation” and “important operational and strategic concerns that military planners will need to consider over the coming decades:
1 Difficulties maintaining military capability; 2 Loss of strategic defence assets; 3 Greater calls for peacetime deployments; 4 Instability in strategically important regions.” A whole chapter covers “Implications for National Security and the Military”, including “Difficulties maintaining military capability; Loss of strategic defence assets; Greater calls for peacetime deployments; and Instability in strategically important regions.” The report concludes: “The risks of climate change demand a rethink of approaches to security.” The report is authored by Chris Abbott of Bristol University's Centre for Governance and International Affairs, published by Oxford Research Group “building bridges for global security.” (January 2008) Ref.573

**UNEP’s Year Book 2008**

UNEP’s Year Book 2008 highlights the impacts of global warming (from the melting of permafrost and glaciers to extreme weather events), also showing the changes in policies and actions of leaders of governments, companies, and the UN itself in addressing issues related to climate change. It shows that business begins to see climate change as an opportunity rather than a burden, as a growing numbers of companies embrace environmental policies and investments in clean technology and renewable energies are increasing. (February 2008) Ref.574

**State of the World Reports**

*State of the World 2009*

*State of the World 2009: Into a Warming World* by Worldwatch Institute is a comprehensive analysis of potential evolution of climate change by the end of the century and of the urgent actions and policies that need to be taken now. It is “intended to inject new inspiration and energy into national and international climate negotiations.” It examines the technologies that would be the most efficient for reducing greenhouse gas emissions; policies and strategies to address climate change; ideas for saving biodiversity; and security implications of climate change. It also includes a climate change reference guide and glossary. (January 2009) Ref. 575

*State of the World 2006*

The Worldwatch annual report, *State of the World 2006*, is a comprehensive overview and analysis of the world situation from the point of view of resources, biodiversity, population, and economic growth, and their impact on the world’s ecosystems. This year’s report has a special focus on the two fastest growing economies and most populated region: China and India. The report highlights the huge impact that the policies and paths of development of these two countries has on the whole globe from all points of view, even to the point of being a determinant for a better or catastrophic future. (January 2006) Ref. 576

**Environmental Change and Security Program 11th Report**

The 11th report of the Woodrow Wilson Center Environmental Change and Security Program discusses the implications and eventual links among environmental problems and population dynamics, and conflict. According to the international panel of experts, stabilizing population growth, and protecting natural resources and the environment should be part of the long-term strategy for resolution and avoiding of conflicts around the world. The report emphasizes that more research is necessary for understanding regional aspects of the links connecting environment, population, and security. (March 2006) Ref. 577
Greenland Conference on Global Warming
Environmental ministers and other officials from 23 countries around the world and the EU met on the edge of a retreating glacier (110 Km in 45 years) in Greenland and agreed that nations must take action against global warming. The proceedings of the conference were not made public and although the group didn’t make specific action recommendations, there was consensus that discussions need to be urgently replaced by action. (August 2005) Ref. 578

Developing Countries Most Affected by Global Warming
Consequences of global warming are increasingly felt, mostly by developing nations. Rising sea levels force inhabitants of some South Pacific islands to relocate. The World Bank warns that development programs are jeopardized by climate change in many regions around the world and urges the international community to integrate climate risk concerns in development strategies. (September 2006) Ref. 579

World Resources 2005 -- The Wealth of the Poor: Managing Ecosystems to Fight Poverty
This joint report from UNEP, UNDP, the World Bank, and the World Resources Institute suggests an approach to addressing poverty by focusing on environment and local natural resources beyond the conventional aid projects, debt relief, and trade reform. It presents models on how natural resources—soils, forests, water, and fisheries—managed at the local level—could be the most effective means for the world’s rural poor people to generate a better life. The report pleads for community stewardship of local resources as a critical element of any poverty-reduction activity. UNEP executive director Klaus Toepfer called the report, “essential reading for any world leader serious about defeating poverty.” This is the 11th in a series of biennial reports on global environment and governance. (September 2005) Ref. 580

Arctic Debate

Potential NATO Military Presence in the Arctic
Delegates to a NATO meeting held in Iceland discussed the security implications of Arctic thawing and the potential need for a NATO military presence in the region. In view of the arguments among powerful nations over sovereignty and resources, NATO Secretary-General Jaap de Hoop Scheffer noted, “It should be a military presence that is not overdone, and there is a need for political cooperation and economic cooperation.” The U.S. Arctic policy was published January 9, 2009. (January 2009) Ref. 581

Arctic Needs New International Regulations
Legal experts participating to the Polar Law Symposium hosted by the United Nations University and the University of Akureyri in northern Iceland, September 7-9, 2008, concluded that a new legal framework is needed for the fragile and changing polar regions. They put forward a set of recommendations to governments, international bodies and other interested parties (to be distributed within six weeks of the event). “Many experts believe this new rush to the polar regions is not manageable within existing international law,” said A.H. Zakri, Director of the UNU Yokohama-based Institute of Advanced Studies, while Tatiana Saksina of the WWF expressed that “there should be new rules, stricter rules. We are proposing a new convention for the protection of the Arctic Ocean.” Meantime, Russian President Medvedev re-launched military patrols in the Arctic waters and
called on the security agency to establish a formal border in the region since it had “strategic importance” for Russia, while Gazprom announced the creation of a subsidiary company for the Arctic reserves exploration.

The economic benefits of an ice-free Arctic are also pushing the EU’s polar strategy up on the policy agenda, while a US-Canada expedition will explore the Arctic region, collecting data for mapping the Arctic seafloor and studying the geology of the sub-seafloor to build the case for the two countries’ rights. [See also The Debate over Strategic Control of the Arctic is Heating Up in July-August 2008, and other related items in previous environmental security reports.]

European Parliament Adopted Resolution on Arctic Governance

A resolution adopted by the European Parliament on October 9 regarding Arctic governance stipulates that the European Commission should get an ‘observer status’ on the Arctic Council to increase its proactive role in the region and should set up a “dedicated Arctic desk.” It also suggests that the EC open negotiations for an international treaty for the protection of the Arctic, which at the beginning should cover at least the unpopulated and unclaimed areas. Along with preservation, the commission should also consider a framework for possible exploitation of the Arctic’s potentials. The MEPs expressed concerns that the ongoing race for Arctic resources could lead to security threats for the EU. The EU is due to publish its own guidelines for work in the Arctic this November. (October 2008) Ref. 583

EU Arctic Policy Guidelines

The recently published EU ‘Communication’ concerning the Arctic stipulates that the Arctic becomes a priority in the European Northern Dimension policy due to potential implications for European security and stability. It outlines the EU Arctic framework built around three main policy objectives: “1) Protecting and preserving the Arctic in unison with its population; 2) Promoting sustainable use of resources; and 3) Contributing to enhanced Arctic multilateral governance.” (November 2008) Ref. 584

The Debate over Strategic Control of the Arctic is Heating Up

This year, for the first time in known human history, both the Northwest and Northeast Passages are free of ice, opening the opportunity for the Arctic shortcut shipping route. Scientists estimate that by the summer of 2030, the Arctic might be completely ice-free for a few weeks. This increases concerns over security, environment, and resource-race issues, but, most of all, over the strategic control of the Arctic. While the multilateral negotiations are stalled, the Nordic countries continue to build their cases for territorial and security claims. Canada is expanding by half a million square kilometers its Arctic Ocean territory—doubling the 100 nautical miles of the coastline that it presently regulates—and will make it mandatory for all ships entering its polar waters to report their presence. By the current regulations, registration with national authorities of ships in the Arctic is voluntary. “Canada takes responsibility for environmental protection and enforcement in our Arctic waters,” said Prime Minister Stephen Harper. The claim includes the Northwest Passage, which no other country recognizes as a Canadian waterway. At a geology conference in Norway, Canada detailed its territorial claims to the Lomonosov Ridge, arguing that the ridge is part of the North American continent, not part of Siberia, as Russia has asserted. Canada’s argument is supported by the Danish government, which also hopes to expand its part of the energy-rich ridge. Meantime, Greenland, encouraged
by possible increased revenues from resource exploitations, hopes to become financially
declared that the first results show that the Lomonosov Ridge is an
extension of Siberia, thus backing the country's bid to take control of the region. Denmark sent
scientists on a month-long expedition seeking evidence that the Lomonosov Ridge is a
geological extension of Greenland. Canada is determined to defend its sovereignty over the
region's Northwest Passage and some Arctic territory; “We either use it or lose it. And make no
mistake, this government intends to use it,” said Canadian Prime Minister Stephen Harper.
Canada is establishing an army training center at Resolute Bay (about 370 miles south of the
North Pole) and a deepwater port on the north end of Baffin Island. “The Russians, Canadians
and Danes all have overlapping claims in the polar region. It is unclear how this can be
resolved,” said Øystein Jensen, a maritime law expert with Oslo's Fridtjof Nansen Institute.
(August 2007) Ref.587

Arctic Access, Territorial Claims, Energy Resources and Environmental Management
Global warming is expected to increase access to the Northwest Passage and other Arctic areas.
Canada announced the construction of up to eight Polar Class 5 Arctic Offshore Patrol Ships and
the establishment of a deep-water port in the far North. A Canadian opposition party and some
Canadian analysts say Canada should do much more to assure its sovereignty over the area. The
status of some Canadian Arctic waters is not clear among the relevant neighboring counties with
varying territorial claims in the Arctic. Russia planted its flag on the seabed 4.2 km below the
North Pole to strengthen its claims over a large Arctic area. [See also The Disputes over the
Northern Territories Set to Continue in June 2007, New Canadian Strategies for Monitoring the
Northwest Passage in August 2006, and Arctic Northern Passage Opens New International
Issues of Regulation in February 2006 environmental security reports.] (July 2007) Ref.586

Arctic Debate Intensifies
Debate over the Arctic ownership is intensifying, as Canada, Denmark, Norway, Russia and the
U.S. are all building their political and legal cases to claim jurisdiction over different (sometimes
overlapping) areas. Russia declared that the Lomonosov Ridge is an
extension of Siberia, thus backing the country's bid to take control of the region. Denmark sent
scientists on a month-long expedition seeking evidence that the Lomonosov Ridge is a
geological extension of Greenland. Canada is determined to defend its sovereignty over the
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and Danes all have overlapping claims in the polar region. It is unclear how this can be
resolved,” said Øystein Jensen, a maritime law expert with Oslo's Fridtjof Nansen Institute.
(August 2007) Ref.587
The Disputes over the Northern Territories Set to Continue
As the North is warming up, opening access to its rich resources, the territorial claims over the Arctic region are set to increase. Reportedly, Russia is prepared to challenge the international community and claim sovereignty over large parts of the Arctic region that is now under the International Seabed Authority, on grounds of the region’s geological continuity and similarity with continental Russia. (June 2007) Ref.588

Arctic Debate Update
Less than one month after the five Arctic countries agreed at the summit to follow the Law of the Sea in resolving the Arctic disputes, Russian Lt. Gen. Vladimir Shamanov, head of the Defense Ministry’s combat training directorate said that Russia started the revision of their military training program to be prepared for fast deployment in “the Arctic in case of a potential conflict.” He invoked the “reaction of a certain number of heads of state to Russia’s territorial claims to the continental plateau of the Arctic” and the large-scale U.S. Northern Edge 2008 military exercise conducted in Alaska in late May. (June 2008) Ref.589

Canada to Begin Monitoring Traffic in Northwest Passage by mid-2008
In view of increasing disputes over the Northwest Passage, Canada announced that it will begin monitoring the area’s sea traffic by underwater listening devices. Beginning in mid-2008, Canada's military will monitor ships and submarines using detection technology installed at Gascogne Inlet on Devon Island, near one of the main arteries of the passage. Canada is at odds with Russia, Denmark, Norway and the United States over the Northwest Passage. (September 2007) Ref.590

Arctic Disputes Continue
An authoritative report, *Climate Change and International Security*, to the European Council, among other recommendations for addressing security issues in the new context of climate change, recommends “Develop an EU Arctic policy based on the evolving geo-strategy of the Arctic region, taking into account i.a. [inter alia] access to resources and the opening of new trade routes.” It notes, “The increased accessibility of the enormous hydrocarbon resources in the Arctic region is changing the geo-strategic dynamics of the region.” A recent U.S. survey revealed that the Alaska continental shelf might extend more than 100 nautical miles farther from the U.S. coast than previously assumed, therefore eventually giving the U.S. the right to claim access to extra seabed resources if it were party to the Law of the Sea treaty. In the meantime, the US-based Arctic Oil & Gas Company has filed a claim with the UN to act as the sole “development agent” in the Arctic region, with exclusive rights to extract oil and gas from the central Arctic Ocean currently beyond the territorial control of the polar nations. (March 2008) Ref.591

Arctic Northern Passage Opens New International Issues of Regulation
Thawing of the Arctic sea ice opens up the Northern Passage as an international shipping route, triggering international disputes over sovereignty and ecological implications. Although scientists, politicians, and environmental activists are increasingly warning about the complexity of the problem, no international regulations are yet in place for this fragile region. Alex Wolfe, from the University of Alberta and leading researcher on the Arctic, says that besides the sovereignty and ecosystem issues of the opening of the Northern Passage, there are also shipping
safety problems that are not yet adequately addressed. As of our information, there are no international shipping standards or regulations in place for ecosystem protection for Northern navigation. Canada claims that the waterway is Canadian territory, while other countries consider it international waters. There is no international treaty dividing the Arctic between the eight countries with claims: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the U.S. This exposes the northern passages to other possible problems, such as: transportation of illicit materials and illegal immigrants and as a place and route for terrorism, as well as difficulty in solving eventual disputes over tanker accidents, contamination, and overfishing. In March 2006, Canadian military forces will begin Operation Nunalivut ("land that is ours" in Inuktitut, the Inuit language), over the Arctic islands and sea ice of the Northwest Passage.  

Northwest Passage to Become “Canadian Internal Waters”
The Canadian government mounted an expedition to defend the Northwest Passage as Canadian territory. This is the largest Canadian expedition in 60 years in the Arctic, with troops traveling 2800 miles across the region that is changing rapidly as a consequence of climate change. In addition to sailing, the opening of the Northwest Passage is an opportunity for access to rich resources, including oil. Recent research suggests that the passage could become ice-free and open for navigation as soon as 2015. While Canada claims sovereignty over the region, it is at odds with other countries including Denmark and Russia who argue that the area is a continuation of their territory. [See also Arctic Northern Passage Opens New International Issues of Regulation in February 2006 environmental security report.] (April 2006) Ref. 593

Disputes over Polar Regions Expands
The race for claiming polar territories expends from the Arctic to Antarctica. The Antarctic should be protected by the 1959 Antarctic Treaty and related agreements that protect the continent against activities relating to mineral resources except scientific ones. Nonetheless, Britain’s Foreign Office plans to claim 1 million sq km (386,000 sq miles) of seabed off the coast of the British Antarctic Territory. Greenpeace and WWF warned that Britain’s possible oil, gas, and mineral exploration in the region would represent an environmental disaster for the fragile ecosystem. Similar claims for seabed areas might also be submitted by Chile and Argentina, which might overlap some of the British territorial claims. Meantime, the Arctic disputes continue. Encouraged by the prospect of increased oil and minerals access due to global warming, Greenland is contemplating eventual independence from Denmark. Warning that climate change is becoming a threat to worldwide peace and security, German Foreign Minister Frank-Walter Steinmeier noted with concern that the rival territorial claims in the Arctic could turn into a Cold War. “Policies to fight climate change can, and will, become an important part of peace policies,” he added. Note: On August 21st this year, for the first time on record, the Northwest Passage was opened to ships not accompanied by or armored as icebreakers. [See also Arctic Debate Intensifies in August 2007, Arctic Access, Territorial Claims, Energy Resources and Environmental Management in July 2007, and other similar items in previous environmental security reports] (October 2007) Ref. 594

Kyrgyzstan’s Deforestation Threatens Central Asia’s Security
The Kyrgyz government’s Agency for Environmental Protection and Forestry and environmentalists have issued warnings about the country’s rate of deforestation and its
consequences. It is estimated that over the past 50 years, half of the forest cover was lost, and illegal logging continues at a rate about at par with the legal one, maintained by corruption and the population’s low living standard. Kyrgyzstan forests are crucial for the whole Central Asian ecosystem, their disappearance causing water scarcity, health problems, and more frequent natural disasters such as floods, landslides and droughts. Experts demand better enforcement of international environmental regulations to which the country is party. [See also UN General Assembly Adopts Global Forest Agreement in December 2007 and Environment and Security Program in the East-Caspian Region in September 2007, Network of Environment Centres in Central Asia in February 2004, and Prospective International Agreements for Mountain Regions in October 2002 environmental security reports.] (March 2008) Ref.595

Indian and Chinese Assessments of Climate Change Consequences
Indian and Chinese authorities have increased warnings on the consequences of global warming on the coastal areas. In India, the National Coastal Zone Management Authority notes that millions of people living along India's 3,700 km (2,300 mile) eastern coast are vulnerable to storms, flooding and tsunamis; sea levels in some parts of the Bay of Bengal were rising at a rate of 3.14 mm annually, while off the coast of Khulna in Bangladesh the rate is 10 mm every year, and rising sea levels are eroding 1 meter (3.2 feet) of land every year along the coast of West Bengal state. India plans to conduct a study next year on how to mitigate the vulnerability to climate change of its 7,500 km (4,660 mile) coastal area. The first Chinese official National Climate Change Assessment also warns on devastating consequences of climate change on the Chinese economy (mainly agriculture) and increasing vulnerability of its coastal areas. Nevertheless, economic development remains the country's primary task, neglecting radical measures to address greenhouse gas emissions and pollution, states a report. (April 2007) Ref. 596

Indigenous Peoples Highly Vulnerable to Climate Change
An international symposium at Oxford University focused on the threat of climate change to the world’s indigenous peoples. They have already begun feeling the consequences of climate change and in some cases their whole way of life has to change radically, as they depend directly on natural resources threatened by global warming. It was agreed that indigenous communities have to work together with scientists and decision makers for designing and implementing adaptation measures for preventing possible catastrophic consequences of global warming on their people. (April 2007) Ref. 597

Security Implication of Climate Change to the EU
Climate Change and International Security. Paper from the High Representative and the European Commission to the European Council analyses the security implications of climate change in general and with specific implications to the EU, and makes some recommendations for EU policies. It reviews the main categories of threats posed by climate change to security (Conflict over resources; Economic damage and risk to coastal cities and critical infrastructure; Loss of territory and border disputes; Environmentally-induced migration; Situations of fragility and radicalization; Tension over energy supply; and Pressure on international governance) and then addresses vulnerabilities by specific regions (Africa; Middle East; South Asia; Central Asia; Latin America and the Caribbean; and The Arctic). The report concludes that “The impact of climate change on international security is not a problem of the future but already of today and one which will stay with us” and underlines that the European Security Strategy and related
proposals “should take account of the security dimension of climate change.” Some specific recommendations include “Focus attention on the security risks related to climate change in the multilateral arena; in particular within the UN Security Council, the G8 as well as the UN specialized bodies (among others by addressing a possible need to strengthen certain rules of international law, including the Law of the Sea),” capacity building from detection to adaptation, addressing migration issues, and adapting cooperation with other countries to the new realities induced by climate change. (March 2008) Ref.598

**Recommendations for Addressing U.S. Environmental Security**

*Insecure About Climate Change* is an essay summarizing a recent special report for the Council on Foreign Relations, *Climate Change and National Security: An Agenda for Action*. It makes some specific recommendations to “strengthen national security by reducing U.S. vulnerabilities to climate change at home and abroad,” such as: establishing a new “deputy undersecretary of defense position for environmental security [emphasis added]… to redress the insufficient institutionalization of climate and environmental concerns in the Department of Defense; … several senior positions in the National Security Council dedicated to environmental security” and eventually a “special advisor to the president on climate change with some budgetary authority.” The author also makes some financial suggestions to help developing countries prepare for climate change, “including $100 million (over several years) for military-to-military environmental security workshops; …another $100 million per year to support an African Risk Reduction Pool” as “part of a broader international risk reduction effort that… should be on par with the president’s five-year, $15 billion emergency plan for AIDS relief.” The author of the essay and report, Joshua Busby, is assistant professor at the LBJ School of Public Affairs at the University of Texas at Austin and fellow with the Robert S. Strauss Center for International Security and Law. (March 2008) Ref.599

**Climate Change: A New Threat to Middle East Security**

The *Climate Change: A New Threat to Middle East Security* report by Friends of the Earth Middle East (FoEME) highlights that consequences of climate change—mainly rising sea levels and freshwater shortage could exacerbate security risks in the Middle East. Unless adequate adaptation actions, the large-scale consequences include threat to “national, regional, and global security” warns Nader Khatib, Palestinian Director of FoEME. ([December 2007] Ref.600

**NATURAL DISASTERS**

The increasing number and intensity of natural disasters, the toll of lost lives, the devastating impact on human habitat and environment, as well as the financial implications for aid and reconstruction brought natural disasters to a leading place on the international agenda.

**New 2009 Terminology on Disaster Risk Reduction**

United Nations International Strategy for Disaster Reduction (UNISDR) released an extensively upgraded terminology to help international common understanding and application of disaster risk reduction concepts. It also includes new concepts that are not in widespread use but are of growing professional relevance. (January 2009) Ref. 602
Scientific Evidences and Potential Consequences
(Listed by month in reverse chronological order)

The UN Inter-Agency Standing Committee and the UN International Strategy for Disaster Reduction noted that the number of disasters doubled over the past 20 years, reaching more than 400 annually and it is expected that the intensity, frequency, duration, and extent of weather-related hazards will rise over the next 20 years around the world. The UN Office for the Coordination of Humanitarian Affairs (OCHA) noted that in the period 1988-2007, over 75% of disasters were climate-related, and accounted for 45% of deaths and 80% of the economic losses caused by natural hazards.

According to the World Meteorological Organization, in 2008 the average temperature on Earth was 0.31°C higher than the 1961–1990 levels, with serious changes in climate patterns, such as the warmest winter in more than 100 years in Scandinavia, the longest hot summer on record in parts of Australia, and unusual cold for a large part of Eurasia. Some parts of the U.S., India, Pakistan, Vietnam, and Bangladesh were the nations worst hit by the devastating effects of flooding and cyclones as a result of climate change, with tens of thousands of people losing their homes and more than 10 million displaced. The re-insurance company Munich Re said that 2008 was one of the most devastating years in terms of natural disasters, in both human and economic terms.

The British Met Office warns that the average global temperature for 2009 is expected to be more than 0.4°C above the long-term average, despite the La Niña phenomenon. NASA estimates that a 1°C increase in ocean surface temperatures could trigger a 45% increase in thunderhead formation, potentially increasing the frequency of severe tropical storms and their devastating impacts on developing countries by 6% in the next decade.

Other studies warn about climate change in different parts of the world: Latin America and the Caribbean might experience more destructive hurricanes and melting glaciers; New Zealand is threatened by drought, while the Arctic might have reached the point of irreversible climate change with temperatures rising much faster than anywhere else in the world. (December 2008) Ref. 604

The World Meteorological Organization’s Global Atmosphere Watch reports that climate-warming greenhouse gases reached record levels in 2007. Using the NOAA annual greenhouse gas index, it found that the total warming effect of long-term greenhouse gases has increased by 1.06% compared to 2006 and by 24.2% since 1990. WMO’s Greenhouse Gas Bulletin reports that, compared to the previous year, CO₂ rose 0.5%, methane 0.34%, and nitrous oxide 0.25%, while slight decreases were noted for chlorofluorocarbons (mainly due to the implementation of the Montreal Protocol).

The 2008 Atlantic hurricane season set a few records in U.S. and Cuban recorded history—as to number, force, frequency and length of storms, say meteorologists. Data on consequences are still being calculated. (November 2008) Ref. 605

Worldwatch Institute reports that 874 weather-related disasters were recorded in 2007, representing 91% of all natural disasters, the largest annual total since systematic recordkeeping began. These disasters caused $69 billion in recorded losses worldwide. The Institute says that there is a 66% likelihood that climate change will lead to more heat waves, heavier precipitation, broader droughts, and more-intense tropical cyclones—all of which could further increase the
number of catastrophic weather events. Along the same lines, WWF’s report *Climate change: faster, stronger, sooner* warns that Europe will be confronted with more extreme weather conditions from severe cyclones to heat-waves, floods, and droughts. (October 2008) Ref.606

The four tropical storms, Fay, Gustav, Hanna and Ike, destroyed all of Haiti’s harvest, killed at least 328 people, and left some 800,000 people—about 10% of the population—in need of emergency assistance. Cuba, struck by hurricanes Gustav and Ike also suffered what the government described as the worst damage in the island’s history. In India, the unusually strong monsoon caused enormous flooding, with an estimated 3 million people in need of assistance “such that only the Army can handle it,” said Parshuram Rai, director, Centre for Environment and Food Security (CEFS) in New Delhi.

Meantime, in the arid Somali Region of Ethiopia it has not rained for three years, and the Horn of Africa is facing a humanitarian crisis, with 17 million people, including 3 million children, in urgent need of food and other critical assistance.

Australia’s national science agency, the Commonwealth Scientific and Industrial Research Organization, warned that the country should prepare a network of long-term coastal observation sites to improve large wave understanding and increase preparedness for more severe and frequent storms. (September 2008) Ref.607

The “Weather and Climate Extremes in a Changing Climate” report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research warns that extreme weather events such as the drought that hit this year in Atlanta, the heat-wave in New York, and the flooding of Des Moines are likely to increase in frequency across North America as the planet warms.

At the opening of the 11th International Coral Reef Symposium in Fort Lauderdale, attended by more than 2,500 scientists and government officials, NOAA revealed that nearly half of U.S. coral reef ecosystems are considered to be in “poor” or “fair” condition.

A “Position Analysis: CO2 Emissions And Climate Change: Ocean Impacts And Adaptation Issues” by the Australian Antarctic Climate & Ecosystems Cooperative Research Centre suggest that oceanic acidification rose to the point that it should be considered in security strategies and longer-term national risk assessments. The analysis states that CO2 in the atmosphere is at its highest level in 650,000 (possibly 23 million) years, and half has been dissolved in the oceans, increasing their acidity. Ocean acidification affects coral structures, marine life, and fisheries, potentially threatening the food security of millions in the Asia-Pacific, and presenting strategic and humanitarian challenges. As environmental threats for Pacific Island communities increase, so mount demands on Australia to assist countries facing environmental disasters. (July-August 2008) Ref.608

The Northern hemisphere spring of 2008 was the seventh warmest on record, nearly one degree warmer than the 20th century average, according to the National Climatic Data Center. It was also marked by weather extremes around the world: Cyclone Nargis which devastated Myanmar (Burma); record low spring snow in Europe and Asia; severe drought in China; North America devastated by strong storms, flooding, tornadoes (reported number for half-year exceeding 10-year annual average) and drought (in the West); and the first two big tropical storms hitting Central America. Meantime, Australia’s fall is unusually dry, aggravating the drought in many parts of the country. (June 2008) Ref.609
Tens of thousands of people died and hundreds of thousands lost everything in Myanmar as tropical cyclone Nargis hit the Southeast Asian country, also known as Burma. The tragedy was increased by the lack of preparedness and response capability of the country and the ban on intervention by foreign aid agencies.

Although there is no consensus on linking storms’ number and strength to climate change, some experts say that there is evidence of a probable trend that storms are becoming more powerful as global warming heats up the oceans. Professor Kerry Emanuel, an MIT meteorologist says that the power of tropical cyclones has roughly doubled since the 1950s, with the most increase occurring over the last three decades, consistent with man-made global warming.

Considering the rate so far, 2008 might be the year with the most tornadoes in the U.S. since 1950—when modern recordkeeping began—and the deadliest in a decade, reports The Weather Channel. In some states, the number to date of such storms already exceeds the yearly average: Mississippi had 49 tornadoes compared to an annual average of 39 twisters average; Alabama 45 versus 42, and Arkansas 49, compared to 48.

A comprehensive study conducted by an international research team from 10 institutions around the world, led by NASA's Goddard Institute for Space Studies, found conclusive evidence of the link between human-caused climate change and the trends of change of Earth’s natural systems. The research analyzed a database of more than 29,000 data series of physical and biological systems, and natural phenomena, on land and in water, with at least 20 years of records between 1970 and 2004. In about 90% of the cases from North America, Europe, and Asia, a link could be established between warming and changes of the systems’ patterns or behavior. The results for Africa, South America, and Australia are not conclusive, due to lack of enough historical scientific data.

Scientists from Switzerland, France and Germany, working on the European Project for Ice Coring in Antarctica, found that “today's concentrations of carbon dioxide and methane are 28% and 124% higher respectively than at any time during the last 800,000 years," increasing the likelihood that human activity is a cause of climate change.

Chinese and Australian scientists are examining possibilities for deeper drilling in parts of Antarctica to find atmospheric records dating back 1.5 million years.

The Living Planet Index reveals dramatic biodiversity reduction since 1970: land species have declined by 25%, marine life by 28%, and freshwater species by 29%. Scientists estimate the current extinction rate being 10,000 times faster than the historical rate. The main causes of species decline are consequences of human behavior: climate change, pollution, destruction of animals’ natural habitat, spread of invasive species, and overexploitation of species.

The Arctic is warming at about twice the global average and the changes of climate and moisture highly impact the region’s vegetation, with possible negative consequences that will further influence global climate. The tundra is shrinking due to the expansion to the north of the boreal forests, which creates large dark surfaces that will absorb—instead of reflecting— solar heat. Reduced moisture increases wild fire potential in the tundra (in 2007, about 250,000 acres of Alaskan tundra burned), further improving the conditions for forest expansion. However, due to likely future drought in the region, the death of trees will be releasing carbon into the atmosphere instead of absorbing it, thus increasing greenhouse gas emissions. (May 2008) Ref.610

Scientists have detected dilution in salinity of the sea around Antarctica and warn that this
could have significant effects on the world's climate and ocean currents. The so-called Antarctic bottom water of this region controls the system of ocean currents spanning the Southern, Pacific, Indian and Atlantic Oceans that shift heat around the globe. The phenomenon might be due to global warming, and in its turn will influence climate change.

For the past 20 years, no significant correlation can be established between climate change and the Sun’s activity, found UK Lancaster University scientists, using three different research methods. The findings support the assessment of the Intergovernmental Panel on Climate Change that man-made greenhouse gas emissions outweigh solar activity variations as a cause of global warming.

Climate change-induced effects might prove costly for the US. Although there is no consensus on the link between global warming and the number of hurricanes, scientists agree that climate change could increase storms’ damaging forces. The National Hurricane Center estimates that the US might be hit by a hurricane that could cause more than $100 billion in damage. Highly populated coastal areas are at highest risk. A category 5 hurricane could produce at least $140 billion in damage to South Florida. (April 2008) Ref.611

The number of people affected by natural disasters in 2007 reached 200 million, considerably higher than the 135 million in 2006, according to the annual study by the Belgian research center Centre for Research on the Epidemiology of Disasters (CRED) of the Catholic University of Louvain. Except for the August earthquake in Peru, the ten deadliest disasters were all climatic, with flooding affecting the most people and being the deadliest. Asia was the region most touched by climatic disasters, but overall, the U.S. experienced the highest number of natural disasters (22), ahead of China (20) and India (18).

Heavy rains for several weeks caused heavy flooding in Zambia, Mozambique, Zimbabwe and Malawi, displacing thousands of villagers and devastating the largely agriculture-based economies of the region. The UN noted that the Mozambique floods could be the worst in memory.

Australian meteorologists suggest that the country’s weather patterns are changing and that stronger storms, droughts, and higher temperatures might become the norm. Statistics show that 2007 was the warmest year on record for New South Wales and the Murray-Darling Basin, and the 11th year in a row experiencing above normal temperatures and the 7th with below-average rain, with the southeast of Australia facing the worst drought in living memory. (January 2008) Ref.612

Summarizing the notable climate events of 2007, the World Meteorological Organization (WMO) remarks on devastating floods; drought and falling freshwater reserves; intense storms in various places around the world; and record-low Arctic sea ice extent that opened the Canadian Northwest Passage for the first time. It reports that the decade of 1998-2007 is the warmest on record, with the global mean surface temperature for 2007 estimated at 0.41°C (0.74°F) above the 1961-1990 annual average of 14°C (57.20°F). Extreme temperatures included unusually cold winters in South America, heat waves affecting Europe, and making 2007 probably the hottest year on record in the Northern Hemisphere. Some scientists believe that weird weather patterns might become the norm and that the world is more than 50% likely to experience serious climate change as it is unlikely to keep greenhouse gases levels low enough to avoid the critical 2°C (3.6°F) temperature rise. (December 2007) Ref.613
The number of weather-related disasters worldwide now averages 400–500 a year, compared to 125 in the early 1980s, and the world should increase mitigation and preparedness efforts, notes Oxfam report Climate Alarm Disasters increase as climate change bites. Geological disasters—such as earthquakes, are about the same, indicating that global warming is to blame, remarks the report. Factoring in population growth, the number of people affected also rises considerably. As of August 2007, some 248 million people were affected by flooding in 11 Asian countries alone. The November cyclone Sidr claimed another estimated 10,000 human lives and left about 3 million homeless in Bangladesh. (November 2007) Ref.614

The International Federation of Red Cross and Red Crescent Societies have stated that more than 250 million people a year are now affected by so-called natural catastrophes, a third more than ten years ago. The federation has already responded to more than 100 floods in 2007; in 2006, the humanitarian groups responded to 482 disasters, up from 278 in 2004. Climate change is cited as one of the causes that led to 60% of Georgian farmers losing all of their crops. Australia’s first bush fires also triggered fears over the intensifying effects of climate change. By 2030, the already dry continent might get warmer by about 1.8 degrees Fahrenheit, and drier due to estimated 3% annual rainfall reduction, forecasts the Climate Change in Australia report produced by the Commonwealth Scientific and Industrial Research Organization and the Bureau of Meteorology. Note: a survey of 1,213 people conducted in July showed that 40% of Australians consider global warming a greater threat to security than Islamic fundamentalism; only 20% deemed it less. In Southern Africa, environmental degradation and global warming change rainfall patterns, decreasing in some regions—thus causing drought, and increasing in others, which might produce floods, warned scientists attending the Southern Africa Development Community meeting at mid-September. They also discussed adaptation strategies. (October 2007) Ref.615

In Africa, the worst rains in 30 years caused flooding affecting an estimated 1.5 million people in 22 countries, including Ethiopia, Niger and Sudan, increasing the humanitarian crisis, reports the UN Office for the Coordination of Humanitarian Affairs (OCHA). Hundreds of thousands of people have been displaced and the risks of epidemics are rising. In other parts of the world, strong hurricanes also produced serious damages during September. (September 2007) Ref.616

Between 2004 and 2006, the number of emergencies due to natural disasters doubled, from 200 to 400. This year’s monsoon affected an estimated 30 million in South Asia, and millions of Africans were also affected by flooding throughout the continent. Scientists expect increased natural disasters over the next decades and researchers warn that risks of flooding might be underestimated. (August 2007) Ref.617

Japan's Meteorological Agency announced that the ocean around Japan has warmed up by 0.7 to 1.6 degrees Celsius over the last century, far higher than the world average of 0.5 degree Celsius. (May 2007) Ref.618

The United Nations Intergovernmental Panel on Climate Change 4th Assessment Report, Climate Change 2007: The Physical Science Basis, intensified the debate and worries about global warming and is likely to increase response efforts. The report assesses the global situation as a whole (changes in the Earth's climate including atmospheric composition, global average
temperatures, melting glaciers, rising sea levels, ocean conditions, and other climate changes) and presents global and regional future climate projections. It states with “very high confidence” that global warming is being caused by human activity and that “carbon dioxide emissions will continue to contribute to warming and sea level rise for more than a millennium, due to the timescales required for removal of this gas from the atmosphere.” It presents a grim picture of the future — rising sea levels, more intense storms, extensive drought, and spread of some diseases. “We must, without further ado, agree on the definition of an institutional framework that will enable us to take more effective and efficient collective action,” said UN General Assembly President Sheikha Haya Rashed Al Khalifa. “Momentum for action is building; this new report should spur policymakers to get off the fence and put strong and effective policies in place to tackle greenhouse gas emissions,” said Achim Steiner, Executive Director of the United Nations Environment Programme. (February 2007) Ref. 619

The US National Oceanic and Atmospheric Administration revealed that the CO2 growth rate for 2006 was 2.05 ppm and the yearly average rise since 2001 was 2.1 ppm, meaning a faster accumulation in the atmosphere than scientists expected, and raising fears over the time available to tackle climate change. Preliminary data compiled by the World Meteorological Organization show that globally, the year 2006 is estimated to be the sixth warmest year since recordkeeping began in 1880. Also, 2006 registered the largest ever ozone hole area (September 21-30, 2006) and the second lowest average sea ice extent for the month of September. The organization notes that the September sea ice decline rate is about 9% per decade. Heat waves and droughts hit many parts of the world. The final figures will be released in March 2007. Newly released data by the World Glacier Monitoring Service reveal that in the period 2000–2005, mountain glaciers around the world melted at 1.6 times the average rate of the 1990s and 3 times that of the 1980s. A new study presents a doom-laden future for Europe, arguing that Europe is warming faster than the global average, and climate change will transform the face of the continent, affecting all sectors, but mainly its economy—particularly agriculture and tourism—and health. (January 2007) Ref. 620

Preliminary findings by the World Meteorological Organization (WMO) show that 2006 might be the sixth warmest year on record, with the average temperature estimated to be 0.42°C above the 1961-1990 annual average. It notes heat waves and prolonged drought in some regions, heavy rainfall, storms, and flooding in others, and the continuously decreasing Arctic sea ice. Along the same lines, analysts note that in Europe, this fall, continental temperatures were 1.8°C higher than the long-term average, and the past ten autumns have been the warmest on record. Also in Australia, this year the weather has been exceptionally warm and rainfall in many regions has been at near record lows. Drying has increased significantly in Africa in the past three years, reveals Gravity Recovery and Climate Experiment satellite data. The Chinese Ministry of Science and Technology warns that global climate change will increase "extreme weather events", threatening China’s food production. (A comprehensive government assessment is likely to be released in the first half of 2007.) Central India’s extreme rainstorms rose in number and strength over the past fifty years, most probably due to global warming (December 2006) Ref. 621

During the Climate Change Conference held in Nairobi many reports and papers documenting new climate change-related evidence and challenges were released. Noteworthy ones include:
A report by German scientists is renewing the call on nations to promptly consider strategies for dealing with "sea level refugees"—population living in coastal areas endangered by the rising sea levels and increasing frequency of extreme storms. Canada’s northern native peoples might become environmental refugees, being increasingly isolated as their ice roads and paths to supplies melt.

According to the Office of Maritime Transportation and Hydrography in Hamburg, the North Sea was 2.4°C warmer in October 2006 than the 1968-1993 average; and, since 1988 is in its strongest heating period since the start of recording (1873). Another German institute of research, WGBU, notes that everywhere seas and oceans are transformed by the climatic change: the surface water is heated, the sea level rises, the oceans become more acid, the storms are stronger. (November 2006) Ref. 622

With extreme heat waves in Europe and the hottest summer in North America, scientists argue whether global warming is the cause; most of them agree that it is. “Ten of the last 12 years were the warmest since 1850. The global temperature (since then) rose 0.7 degrees Celsius and most climate models suggest it’s going to continue to warm by 2 to 5 degrees Celsius this century,” says Philip Jones, climate research professor at Britain’s East Anglia University. He also adds that globally, sea levels are rising by around 1.5 millimeters (0.06 inches) per year and have risen some 20 centimeters (7.8 inches) since the late 19th century. Warmer seas due to global warming will most probably also cause changes in precipitation patterns and increase intensity of hurricanes. (The IPCC’s Fourth Assessment draft text, which will be released next year, forecasts a 2–4.5º C warming by 2050—a faster change than their 2001 forecast of 1.4–5.8º C warming by 2100). (July 2006) Ref. 623

A new study by the National Center for Atmospheric Research demonstrates that global warming played an important role in 2005’s record 28 tropical storms and hurricanes in the Atlantic. The study also predicts that, although not necessarily setting another record, 2006 might also experience a ‘very active’ season, with 13-16 named storms, 8-10 hurricanes, and 4-6 major hurricanes. The researchers warn that in the long-term, ocean warming will raise the baseline of hurricane activity.

New scientific evidence that the increased number and intensity of extreme weather events is linked to climate change were presented at the 40th annual Canadian Meteorological and Oceanographic Society (CMOS) congress in Toronto. Over 800 scientists discussed evidence and debated strategies to cope with climate change effects. There is unanimous agreement that reducing greenhouse gas emissions should be high on political and industrial business agendas. (June 2006) Ref. 624

At the European Geosciences Union meeting in Vienna, several scientists revealed recent research and data on greenhouse gas emissions; global warming and its consequences; glaciers' unprecedented melting rates; and the increasing acidity of oceans and its consequences on marine life. There was consensus that human activity is an important driver and that swift action to change current trends and practices should be mandatory. (April 2006) Ref.625

In the preamble to his upcoming book, 'The Revenge of Gaia', James Lovelock, who formulated the Gaia theory—a planetary system which keeps the Earth fit for life—made the astonishing statement that climate change has reached the point of no return due to humans' abuse of the
environment. He argues that before the end of the century the devastating effects will be considerable, as the result of an uncontrollably accelerated process of warming mainly caused by huge emissions of greenhouse gases such as CO₂. He suggests that governments’ efforts — mainly in Europe—should concentrate more on preparedness to cope with consequences of climate change than countering it. The temperature might rise 8°C in the temperate regions and 5° in the tropics. Although some consider Lovelock’s assumptions controversial, there is consensus that the situation is critical and more intense actions are needed to curb global warming. Scientists studying the Arctic are also noting that the polar region is close to or on the edge of the “no return” point. They warn about the effects that the thaw will have all over the world, not just in the north: accelerating global warming, possibly even changing the Earth's weather systems, including significantly changing Europe's climate. (January 2006) Ref.626

Data from climatologists around the world show that 2005 is the record year on many counts: warmest year on record; worst Atlantic hurricane season for intensity, number, and consequences; hottest Caribbean waters ever; worst drought; and least perennial Arctic sea ice cover. The global mean surface temperature in 2005 is currently estimated to be +0.48 degrees Celsius above the 1961-1990 annual average of 14 degrees C, according to World Meteorological Organization (WMO) records. (December 2005) Ref. 627

Several research papers published recently link the increasing numbers and intensity of powerful storms to increasing ocean temperatures, suggesting that global warming is the main cause. Most climate models indicate that the effects of climate change will be felt more intensely farther from the equator. ESA's CryoSat measurements of sea ice are expected to confirm or refute this theory and also help with better weather forecasting.

Dr. Nathan P. Gillett argues in an article published in Nature that the impact of global warming on European weather patterns has been underestimated. The Northern Hemisphere Circulation study compares the results of nine state-of-the-art climate models with real situation of Northern Hemisphere air pressure changes at sea level over the past 50 years. It concludes that the simulations underestimate the sea-level air pressure circulation trends, which questions their accuracy in showing changes of weather patterns or predicting regional climate changes.

A report by population health experts from Australia and New Zealand warns that even with action to reduce global warming, thousands of Australians are likely to die by the end of the century because of heat waves caused by human-induced climate change. It is estimated that by 2100 the annual average temperatures could increase by 1 to 6°C over most of Australia, with significantly larger changes in some regions. The report, Climate change health impacts in Australia, also addresses the danger of spread of dengue-carrying mosquitoes, as well as possible large-scale poverty and migration in the Asia-Pacific region, mainly in the Small Island States that are particularly susceptible to climate change.

Shishmaref, a whole community of 600 residents of NW Alaska, needs to be permanently relocated on the mainland to be protected from storm systems that are certain to arrive, as a consequence of global warming. Other communities from farther north might follow. (September 2005) Ref. 628

A recent paper in Science by NASA scientists reports that Earth is absorbing much more heat than it is losing, a result that adds weight to the pessimistic forecasts on global warming. Their
prediction shows a global rise of 1° F. this century even if greenhouse gases remained at their present level. Some of their new data comes from the Argo ocean sensing project and, combined with readings from other sources, indicates that the planet's surface has a solar energy imbalance of +0.85 watts/square meter.

Researchers found that the amount of sunlight reaching the Earth's surface is increasing, and has been for at least the past ten years, reversing a dimming trend that extended over several prior decades. The reasons for these fluctuations are obscure, but it is likely that this brightening, and consequent increased warming, is at least partly due to a decrease in the emission into the atmosphere of particulates and other sunlight-shielding pollutants from industrial operations. If this trend persists, or even stabilizes, it raises doubts as to whether the current forecasts of global warming are pessimistic enough. (May 2005) Ref. 629

Several UN reports issued in December 2003 warn of dramatic consequences of climate change, which may increase efforts around the world to implement the provisions of the Kyoto Protocol or to make “other deals on the environment.” A WHO report “examines, for example, how weather, air pollution, and water and food contamination affect the way diseases emerge. It further suggests effective means for all countries to monitor and control the health effects of climate change.” The report estimates that 150,000 deaths and 5.5 million Disability-Adjusted Life Years were caused in the year 2000 due to climate change.

A FAO report highlights the growing vulnerability of Small Island Developing States to sea level rises. World Meteorological Organization (WMO) reports that late 20th century temperatures were the highest for the past millennium, the 1990s were the highest decade in the Northern Hemisphere, and 1998 was the warmest year in the past 1000 years. Actions to achieve the objective of the United Nations Framework Convention on Climate Change (UNFCCC) are becoming increasingly urgent. (December 2003) Ref.630

**Greenhouse Gas Emissions**

*(Listed by month in reverse chronological order)*

The American National Academy of Sciences found that CO₂ emissions grew faster then forecasted by the International Panel on Climate Change (IPCC). Between 2000 and 2004, worldwide CO₂ emissions increased at 3.1% per year, three times the 1.1 % per year during the 1990s. The growth was predominantly driven by developing and least-developed economies, which accounted for 73% of global emissions growth in 2004. (June 2007) Ref. 632

An international team of researchers has found that the Southern Ocean’s capacity to absorb man-made carbon dioxide from the atmosphere is weakening, stating that this is the first time they have “convincing evidence that a change in the uptake of CO₂ by the oceans is linked to climate change.” They didn’t expect that to happen until much later in the 21st century. (May 2007) Ref. 633

The Global Carbon Project report shows that carbon dioxide emissions over the last five years grew four times faster than in the preceding 10 years. Global growth rates in 2000–05 reached 3.2%, compared to 1990–1999's 0.8%. The report also draws attention to environmental inertia, by which the environment stores up part of the energy generated by greenhouse gas emissions; causing global temperatures to continue to increase for two or more centuries after emissions are
Greenhouse-gas concentrations reached new highs in 2004, reveals the first annual Greenhouse Gas Bulletin published by WMO. Globally, average concentrations of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) in the Earth’s atmosphere exceed those of pre-industrial times by 35%, 155%, and 18% respectively, reaching their highest-ever recorded levels. The WMO prepared the Greenhouse Gas Bulletin in cooperation with the World Data Centre for Greenhouse Gases (that archives observations from some 44 WMO Members), and with assistance of the U.S. National Oceanic and Atmospheric Administration’s Earth System Research Laboratory. The bulletin with 2005 data is expected in November 2006. NOAA reports that in 2005, the CO₂ average atmospheric concentration reached 381 ppm, an increase of 2.6 ppm since 2004 (although compared to WMO data, the difference would be 3.9 ppm), noting that half a century ago, the annual increase was less than 1 ppm. (March 2006) Ref.635

Permafrost covers much of Russia, Canada, and Alaska. As it melts, trapped methane gas is released, which is twenty times more effective in creating the greenhouse effect than is CO₂. Scientists disagree about how much permafrost will be melted over what period of time; however, the phenomenon has not been properly factored into global warming forecasts. With less snow and ice, solar radiation that used to be reflected off the earth is now absorbed, which furthers the warming impact. New climate simulations using the National Center for Atmospheric Research (NCAR) Community Climate System Model (CCSM) show that global warming may thaw over half of Northern Hemisphere’s permafrost by 2050 and as much as 90% by 2100. This would alter ecosystems across the northern latitudes and might increase runoff to the Arctic Ocean and release vast amounts of carbon as well as methane into the atmosphere in greater volume than now released by fossil fuel usage. Canadian Arctic sea-ice cover has been reduced by about 24% in extent and about up to 50% in thickness since 1978, remarks Louis Fortier, chief scientist aboard the Canadian icebreaker CCGS Amundsen and director of several Arctic research programs. Even more alarming, he notes, since 2004 there are indications that the melting has begun to accelerate, with 2005 an all-time record minimum for sea ice cover. In discussing opening of the Northwest Passage for commercial navigation, besides the ecological implications, he warns about risks linked to pollution, as well as major problems of sovereignty and security for Canada. (December 2005) Ref. 636

Natural Disasters as an Environmental Security Issue
Recent natural disasters increased environmental security concerns. The last few years’ storms, droughts, and heat waves increased poverty and migrations in regions already vulnerable to conflict. David Anderson, former Canadian Environment Minister, said that global warming posed a greater long-term threat to humanity than terrorism. Although natural hazards cannot be avoided, their dramatic consequences can be reduced by preparedness and risk reduction measures including early warning systems, environmental protection, land-use planning, technology development, and education. The World Meteorological Organization (WMO) says that early warning and advance planning, and building a “culture of prevention” could halve the rates of death and destruction in the decade following 2010 compared with this decade. To address these goals, the WMO has launched the Natural Disaster Mitigation and Prevention Programme. The new Early Warning Promotional Platform for natural disasters has been set up in Bonn, Germany, under the auspices of the International Strategy for Disaster Reduction.
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(ISDR). Several international organizations are working closely with the Secretariat for the ISDR in preparing the World Conference on Disaster Reduction to be held in Kobe, Japan, January 18-22, 2005. (October 2004) Ref. 637

Worldwatch Institute: Assessing the Relation between Disasters and Conflict

Beyond Disasters: Creating Opportunities for Peace, a report by Worldwatch Institute: analyses the nature and effect of disasters over the past 20 years and the impacts of human activities on the climate; highlights the factors of vulnerability; and makes a few recommendations to reduce the social consequences of disasters and to eventually use post-disaster reconstruction as an opportunity for building lasting peace. The report considers three case studies: Aceh, 2004 Indian Ocean tsunami—that became a catalyst for peace; Sri Lanka—despite the ceasefire, the conflict continued mainly because of an inadequate post-disaster reconstruction strategy; and Kashmir—the earthquake didn’t influence the stalled reconciliation process. (June 2007) Ref.638

Fourth Assessment Report Climate Change 2007

The first part of the four-volume Climate Change 2007, the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) will be released on February 2, 2007. News released in advance shows that climate change could be far worse than previously expected. A report on this first part of the IPCC Assessment will appear in next month’s environmental security report. The other three parts of the Assessment focus on: impacts, adaptation and vulnerability to climate change—to be released in April; mitigation—to be released in May; and the Synthesis Report—to be published in November 2007. (January 2007) Ref. 639

Adaptation and Vulnerability Report by the IPCC

The Intergovernmental Panel on Climate Change (IPCC) report Climate Change 2007: Impacts, Adaptation and Vulnerability reinforced the scale of the implications of climate change and focused the international community on the emergency of acting on mitigation and adaptation strategies. The report shows that the most severe impacts of climate change will be experienced by people in the poorest regions who have emitted the least amount of greenhouse gases. Billions of people would face water scarcity and hundreds of millions, hunger. Vulnerability to climate change could be exacerbated by other stresses—such as poverty, unequal access to resources, and conflict. Africa will be mostly affected by water and food shortage; low-lying areas worldwide are threatened by floods, erosion, and rising sea levels; changes in precipitation patterns and the disappearance of glaciers from Asia to Latin America will affect water availability for human consumption, agriculture and energy generation; heat waves, forest fires, and extreme weather conditions will increase mainly in North America and Europe. “These projected impacts tell us that we urgently need to launch an agreement on future international action to combat climate change, as well as look for effective ways to generate the funds needed for adaptation,” says Yvo de Boer, executive secretary of the United Nations Framework Convention on Climate Change. The “Summary for Policymakers” suggests that a portfolio of adaptation and mitigation measures is needed to diminish the risks associated with climate change. The Summary, approved by government officials, will most probably guide future strategies such as a post-Kyoto policy, and establishing global mitigation and adaptation frameworks. The third report, Mitigation of Climate Change is scheduled for release in May, and the final Synthesis Report for November 2007. (April 2007) Ref. 640
Human Footprint on Earth Ecosystem at Critical Stage
Two recent studies at the National Center for Atmospheric Research in Boulder Colorado have indicated that global warming will continue to increase even if its causative factors are brought under better control. The investigators, Gerald Meehl and Tom Wigley, used three computer simulations, two extremely detailed, to derive the predictions that, even assuming greenhouse gas content stayed at the 2000 level, there would still be a minimum 0.9° F rise in the global temperature, and a 4" ocean level elevation by 2100, causing severe dislocations. In the worst case, the temperature change could be as much as 6.3°F, with a one-foot rise in the ocean with no further input of greenhouse chemicals.

At the recent meeting in London, environment and energy ministers from 20 of the world's biggest polluters discussed the best policies for sustainable growing non-polluting economies. Britain emphasized that environment-centered economic policy and international cooperation are the only effective way to prevent a crisis caused by global warming.

The UN Secretary-General's report for the reform of the UN also lists climate change as one of the three major challenges for the international community that requires particularly urgent action. (March 2005) Ref. 641

Joint Science Academies’ Statement on Climate Change
The heads of eleven national academies of sciences (all G8 countries plus Brazil, China, and India) issued a joint statement: “Climate change is real”. Documented with scientific and statistical data, the statement makes clear that global warming is occurring and all nations should engage in sustained long-term actions to reduce greenhouse gas emissions, and prepare for the inevitable consequences of climate change. Since the most affected would be those in developing nations, poverty and migration are likely to increase. Although global collaboration will be necessary, the statement also calls on G8 nations to show leadership in addressing climate change and assisting developing nations to meet the challenges of adaptation and mitigation.

[See also 8.4 Climate Change Updates in April 2005 and other previous environmental security monthly reports.] (June 2005) Ref. 642

Millennium Ecosystem Assessment Reports
Millennium Ecosystem Assessment Synthesis Report (Millennium Ecosystem Assessment 1), conducted by 1,300 experts from 95 countries, reveals that approximately 60 % of Earth's vital ecosystem services are being degraded or used unsustainably. Without improved ecology-centered policies, revised consumption patterns, better education, and implementation of new eco-friendly technologies, the situation will worsen in the next 50 years, seriously endangering life on earth. This is the first report in a series of seven synthesis reports and four technical volumes that assess the state of global ecosystems and their impact on human well-being. It has been released together with a statement by the Millennium Ecosystem board of directors entitled “Living beyond Our Means: Natural Assets and Human Well-being.” (March 2005) 643

Biodiversity Synthesis Report (Millennium Ecosystem Assessment 2)
The second Millennium Ecosystem Assessment report, Biodiversity and Human Well–being: A Synthesis Report for the Convention on Biological Diversity (CBD) was released on May 22 to mark the International Day of Biodiversity. [See the March 2005 ES Report, Item 8.7, for the first in this series of seven similar Millennium Assessment papers] In response to requests for information received through the CBD, the report synthesizes and integrates findings related to
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biological diversity from the four MA Working Groups: Conditions and Trends, Scenarios, Responses and Sub-global Assessments. The key findings of the report are: in the last 50 years, human actions have changed the diversity of life on the planet more than at any other time in human history; biodiversity is the foundation for human well-being; human activities are leading to the loss of the variety of life; in the past, actions and programs that promoted conservation and the sustainable use of biological diversity limited biodiversity loss; the size of the task ahead of us is so great that the 2010 biodiversity target will only realistically be achieved in certain areas and regions if we engage in substantial efforts. (May 2005) Ref. 644

Dust and Climate Change
At a recent meeting of the International Geographical Congress, the issue of dust as a hidden climate problem was raised. The deposition of dust can affect the environment in several ways, including climate change, soil salinization, disease transmission, ocean fertilization, ice cap reflectivity change, air pollution, and the neutralization of acid rain. Professor Andrew Goudie of Oxford University claims that in parts of Africa, which appear to be the major sources of global dust, annual dust production has increased tenfold in the last 50 years. Research is scheduled for next year to determine whether dust in some parts of the world is more important than pollution in affecting climate change. (August 2004) Ref. 645

New Developments for Addressing Natural Disasters
The UN will be organizing the 3rd International Early Warning Conference in Bonn from 27 to 29 March 2006. Guided by the motto ‘From Concept to Action,’ the conference aims to implement the ‘Hyogo Framework for Action 2005-2015,’ (adopted at the World Conference on Disaster Reduction in Kobe, Japan, January 2005) and set short- and long-term early warning projects and address high priority needs mostly in critical countries and regions. The conference is expected to be attended by over 600 representatives of governments, parliaments and international organizations, as well as practitioners and members of the scientific community. Meantime, the UN World Meteorological Organization (WMO) decided to increase its role in natural disaster mitigation, particularly for helping the world's least developed countries. The program will be mainly based on better implementation and use of latest the S&T in the domain of weather forecast, climate and water, and cooperation with other international organizations that work in disaster risk and preparedness area. (July 2005) Ref. 646

ICSU Launched Global Disaster Research Program
At its 28th General Assembly, the International Council for Science (ICSU) launched a new program on Natural and Human-Induced Hazards to reduce their economic and social effects. The program will connect natural and social sciences to serve policymakers. It would research ways to improve disaster forecasts and human vulnerability, as well as develop the best policies to mitigate and respond to them. [See also Better Disaster Planning to Avoid Environmental Catastrophes in September 2004 environmental security report.] (October 2005) Ref. 647

New UN Office Using Space Technology to Assist Mitigation of Disasters
A new UN Outer Space Affairs office (UNOOSA) has opened in Bonn, Germany, as part of a future network dedicated to carrying out the UN Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). Providing universal access to space-based information to all countries and relevant organizations, UN-SPIDER covers all
stages of disaster, including risk reduction. The program will improve disaster management and help developing countries strengthen their institutional capacities. UN-SPIDER offices are also scheduled to open in Beijing and Geneva. [See also *Space Technology for Improving Planetary Knowledge and Security* in April 2006, and other related items in previous environmental security reports.] (November 2007) Ref.648

**Google to Support Development of Early Warning System in Vulnerable Regions**

Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced $25 million in grants aimed at addressing global challenges. One of the five core initiatives, ‘Predict and Prevent’ aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying ‘hot spots’ and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated $5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University. (January 2008) Ref.649

**Migration Triggered by Environmental Causes**

There is no adequate international system or framework to cope with environmental refugees, estimated to reach 50 million by 2010 and 200 million (possibly 250) by 2050.

**Progress on Defining Environmental Refugees**

The International Conference on “Environment, Forced Migration and Social Vulnerability” held in Bonn, Germany, October 9-11, 2008, summarized the current state of research and debate on matters concerning environmental migration and moved forward on the issues of definition: what should be considered environmentally-induced migration; measurement procedures and drivers; and legal instruments to protect and assist different categories of environmental migrants. The Council of Europe’s Committee on Migration suggests that environmental migrants’ rights should be considered either in “a separate Convention or as parts of intergovernmental environmental treaties, or as both”, but disassociated from the 1951 Geneva Refugee Convention. The conference considered three categories of migrants: environmentally motivated migrants, environmentally forced migrants, and environmental emergency migrants. The conference also introduced the Climate Change, Environment and Migration Alliance, designed to assist policymakers with environment-related migration issues; and presented preliminary findings by the Environmental Change and Forced Migration Scenarios Project that analyzes migration due to environmental factors in 22 case studies in nine regions. The EFMSV conference was hosted by the United Nations University, was attended by about 600 experts from nearly 80 countries, and was the largest meeting ever held on the topic. The full outcomes of the conference were not yet available at the time of this writing. (October 2008) Ref.651

**New Strategies Needed to Deal with Global Displacement and Migration**

The annual meeting of the UN High Commission for Refugees (UNHCR) governing Executive Committee concluded that new strategies are needed to deal with increasing global displacement
and migration, as well as approaches to tackle their causes, scale, and complexity. In addition to conflict and persecution, environmental degradation, and frequency and magnitude of natural disasters, are among the main causes of increased numbers of refugees. After several years of decline, in 2006 the number of refugees began rising again and continues to mount, remarks UNHCR. The difference between categories of migrants is increasingly blurry. “War is many times driven by scarcity of resources; scarcity of resources can be driven by climate change,” said UN High Commissioner for Refugees, António Guterres. Note: A study by Rafael Reuveny from Indiana University, Climate Change-induced Migration and Violent Conflict, reveals that of 38 cases of migration directly attributable to climate change during the 20th century, half led to conflicts, some of which were violent. [See also Climate Change Refugees in May 2007, UNU Calls for International Framework for Environmental Refugees in October 2005, and other similar items in previous environmental security reports.] (October 2007) Ref.652

Climate Change Refugees Trends

The Australian Defense Force report Climate Change, The Environment, Resources And Conflict, warns of possible conflict in the South Pacific triggered by increased illegal immigration and fishing and potential failed states, as a consequence of climate change and rising sea levels.

In an address to the UN Security Council, UN High Commissioner for Refugees António Guterres warned of new forms of displacement, with natural disasters on the rise due to climate change. He explained the interrelationship between climate change, extreme deprivation, and conflict, and how they can exacerbate each other as causes of displacement. (January 2009) Ref. 654

An estimated 6 million people a year could be displaced by climate change effects, meaning that by 2050, the numbers might be between 200 million and 250 million, putting heavy pressure on aid agencies to meet basic needs, said L. Craig Johnstone, UN Deputy High Commissioner for Refugees. At the Poznan climate change conference, discussions concerning environmentally induced migration focused on helping countries to address the problem within their borders by implementing climate change adaptation measures, rather than considering international aspects. Nevertheless, the European Parliament declaration adopted in June 2008 calling for a legal framework for the protection of the victims of climate events and other similar efforts of the global community increase the likelihood of addressing the international dimension of environmentally induced migration. (December 2008) Ref. 655

Because rising sea levels are expected to eventually submerge most of the Maldives’ 1,200 islands, President Mohamed Nasheed announced that the country will create a $1 billion fund from tourist revenues to explore the possibility of buying land to move its 400,000 population.

A year after cyclone Sidr hit in Bangladesh, 1 million people are still homeless. Additionally, some Bangladeshis have already begun relocating to higher lands. They argue that developed nations should be more open to accepting refugees.

Half of Nigeria’s 150 million people might face displacement, as it is threatened by three effects of climate change: desert expansion in the North, farmland erosion in the East, and flooding from the Atlantic Ocean in the South. (November 2008) Ref. 656
The Australian government has agreed to accept climate change refugees like the ones from Tuvalu, as a last resort, and might create a new visa category to cover climate change refugees. Allegedly, the Tuvalu PM asked Australia to accept all 10,000 Tuvalians in a worst-case scenario. New Zealand now accepts 75 migrants a year. Expert groups indicate that mass evacuation might be necessary within decades. The situation extends to other low-lying nations such as Kiribati and the Maldives. (October 2008) Ref.657

The United Nations High Commissioner for Refugees stated that the number of people of concern rose for the past two years. One of the factors cited was climate change making resources scarcer. UNHCR’s 2007 Global Trends reports that the number of international refugees rose from 9.9 million to 11.4 million by the end of 2007, while the number of internally displaced people increased from 24.4 million to 26 million. As conflict and environmental degradation exacerbate each other, unless adequately addressing the situation in its whole complexity, forced displacement will continue to rise. The most at risk are the already vulnerable areas of Africa and the Indian sub-continent. (June 2008) Ref.658

Worldwatch Institute estimates that roughly one in every 36 people worldwide is moving involuntarily and warns that, as the trend increases, the international community is facing special challenges. Climate change will increase the ranks of “environmental refugees,” especially of the 600 million people living in low-lying areas. A research team from the School of Oceanographic Studies at the Jadavpur University, Kolkata, India, estimate that out of the 4.1 million people living in the Sunderbans, the largest delta region in the world, 70,000 would become ‘environmental refugees,’ by 2020. The initial land given to relocated people was decreased and is causing discontent. The rate of sea level rise is currently approaching 3.14 mm per year near Sagar Island and this could increase to 3.5 mm in the next few years due to global warming. (September 2008) Ref.659

Bangladesh is considered among the countries most vulnerable to rising sea levels as a one-meter rise in sea levels could wipe out 20% of its landmass, creating 30 million environmental refugees by 2050. However, based on 32 years of satellite images, scientists from the Dhaka-based Center for Environment and Geographic Information Services, say that Bangladesh’s landmass has actually increased by 20 square kilometers (8 square miles) annually due to sediment carried down by the big Himalayan rivers—the Ganges and the Brahmaputra. Nevertheless, the highly populated coastal area remains vulnerable to climate change effects such as shorter but more severe monsoons, more violent tropical storms, longer periods of drought, and increased salinization, all impacting people’s livelihoods. (July-August 2008) Ref.660

Janos Bogardi, director of the UNU Institute for Environment and Human Security, called for the UN to create a legal framework to address future environmental refugees, while taking into account fears that by including environmental migrants in the international legislation protecting refugees, “we are weakening one of the strongest tools for protecting refugees.” Hence, the UN “should find other means of helping environmental migrants.” He also emphasized that environmental factors often lie at the root of more obvious causes of migration. Christian Aid estimates that a billion people might be forced to migrate over the next 50 years, mostly as a consequence of environmental conditions. The vast majority will be from the
world’s poorest countries, the Sahara belt, south Asia, and the Middle East. Their report estimates that in 2007 there are 25 million displaced by conflict and human rights abuses, 25 million by natural disasters, such as earthquakes, and 105 million by large development projects, with 8.5 million now officially recognized as refugees. By 2050, it says, 250 million could be permanently displaced by climate change-related phenomena.

Bangladesh, with its 140 million people, is one of the most vulnerable places to climate change. It is likely to face increasingly violent storms, saltwater getting further into the country's rivers, erosion in the coastal areas, severe droughts in the north, and possibly a fifth of the country vanishing under water, if sea level rises by 3 feet by the end of the century. “One island here has more people than all of the small island states put together,” said Atiq Rahman, executive director of the Bangladesh Center for Advanced Studies. (May 2007) Ref. 661

Increasing Weather Extremes and Environmental Refugees due to Climate Change

There might be 200 million climate refugees by 2050, which could increase the likelihood of conflicts in many locations around the world. Experts warn that in addition to the South Pacific low-lying islands that are already affected, millions of people in densely populated countries such as Bangladesh and parts of China, Indonesia, and Vietnam might be forced to move by rising sea levels, while extreme drought might affect 10% of world land by 2050—five times more than now, and 30% by the end of the century (estimate by UK Met Office Hadley Centre). Another study, Going to the Extremes, based on advanced computer modeling, warns that by the century's end, the planet will face more weather extremes such as deadly heat waves, prolonged drought, and intense rainstorms due to global warming caused by human emissions of greenhouse gas. (October 2006) Ref. 662

Environmental degradation causes more refugees than war and politics

A new report by New Economics Foundation claims that more refugees now flee from environmental degradation than from wars or political persecution. It calls for a new category of ‘environmental refugee’ to be created and recognized. The report also goes on to advocate that richer countries have a responsibility for helping poorer ones care for these refugees because of the ecologically destructive economic activities carried out by the more developed nations. It also claims that the Geneva Convention definition of a refugee applies to those uprooted by environmental damage. However, the United Nations High Commission on Refugees (UNHCR) does not agree with the report, citing differences between those forced to flee political persecution and those forced to flee environmental damage. Nevertheless, the sheer number of displaced persons and refugees underscores the need to take environmental security far more seriously. (October 2003) Ref. 663

UNU Calls for International Framework for Environmental Refugees

On UN Day for Disaster Reduction, October 12, the UNU warned that by 2010 the world might have to cope with as many as 50 million environmental refugees, while the international community is not presently equipped with an adequate international agreements system to deal with the situation. UN Under Secretary-General Hans van Ginkel, Rector of UNU, emphasized the need to prepare now “to define, accept and accommodate this new breed of ‘refugee’ within international frameworks,” while Dr. Bogardi, Director of UNU’s Institute for Environment and Human Security (UNU-EHS) in Bonn, cautioned that the term ‘environmental refugee’ might sometimes hide the real cause of displacement, which might be bad policies and practices. [See
also related item *Implications of Environmental Migration to National Security* in February 2004 monthly environmental security report.] (October 2005) Ref. 664

**UN Establishes New Agency for Internally Displaced People**

Only three of the current 21 conflicts are trans-border wars, the remaining 18 are internal conflicts. There are about 50 million internally displaced people (IDPs) who have fled their homes due to conflicts, environmental causes, and government orders. In order to address the IDPs issues, the United Nations established the Inter-agency Internal Displacement Division on July 1st. It will initially focus on the major countries of internal displacement - Sudan, Uganda, Somalia, Liberia, Burundi and Colombia; and will negotiate access to the Democratic Republic of the Congo (DRC) and Sri Lanka. If continued environmental deterioration forces increased migration and conflict within countries that UNHCR is not authorized to reach, then IDP could play an important role in conflict prevention. (July 2004) Ref. 665

**Implications of environmental migration to national security**

Lester Brown, President of the Earth Policy Institute, has written an article on environmental refugees' movements that summarizes the environmental triggers of migration and the relationship of such migrations to national security. Although not precipitated by any single event or addressing any single problem, the article makes the case that a global effort is needed to address the causes of these environmentally-driven migrations. (February 2004) Ref. 666

**Environmental Refugees Cyberseminar Revealed the Difficulty of Defining Environmental Refugees**

A cyberseminar on “Environmentally Induced Population Displacements” conducted August 18-29, 2008 by the Population-Environment Research Network in collaboration with the Environmental Change and Security Program of the Woodrow Wilson International Center for Scholars (http://www.populationenvironmentresearch.org/seminars.jsp) revealed the difficulty of defining environmental refugees. However, there were suggestions that the ongoing academic debate should be associated with more practical applications due to the urgency of the situation. (July-August 2008) Ref. 667

**Desertification Triggering Migration**

Increasing desertification of West Africa is forcing people to relocate, causing more conflict among communities. The executive director of UNEP warned that Africa's next major war might be over water, giving Burkina Faso as an example. The Conference of the Parties to the United Nations Convention to Combat Desertification (UNCCD COP8) noted that desertification affects more than 250 million people, and 1 billion more are at risk, and asked for increased and swift action. The Global Humanitarian Forum, to be launched on October 17, 2007, is being set up by former UN Secretary General, Kofi Annan, to address in a preventive and proactive way global refugee movements and humanitarian crises triggered mainly by climate change. Climate change is, “perhaps the single most important humanitarian challenge of years to come,” says Kofi Annan. The forum will act as a catalyst among the different interest groups involved in international disaster relief and prevention: governments, aid agencies, the military, the business world and academics. (September 2007) Ref. 668

**Desertification Threatens 20% of the World’s Population—UN Secretary-General Says That**
Climate Change Is a Factor
June 17 marked the tenth anniversary of the Convention to Combat Desertification, and the UN Secretary General took advantage of the occasion to issue a widely publicized appeal for strong international action to stop this threat to a fifth of the world's population, one that is consuming almost 1400 square miles per year. Climate change is recognized as one of the causes of this creeping plague, and the Secretary General's message is certain to increase worldwide pressure for US and Russian ratification of the Kyoto Protocol on climate change. A recent analysis in an English-language St. Petersburg newspaper speculated that Russia's ratification is being delayed only by planning for the division of the enormous financial dividend Russia stands to gain from the credit sharing mechanisms of the Protocol.

Note: A new standards system suggested by the Climate, Community and Biodiversity Alliance (CCBA) aims to address global warming by efficient land management.
(June 2004) Ref. 669

Conference on Desertification Calls for Policies to Address Environmental Refugees
The UN International Year for Deserts and Desertification concluded with a Conference held in Algiers, Algeria, December 17-19, convened by the Canadian-based UNU International Network on Water, Environment and Health (UNU-INWEH), with ten other international agencies and hosted by the Algerian government. About 200 experts from 25 countries discussed policies to address desertification and its consequences, including health, economic, and environmental refugee-related issues. UN experts estimate that desertification threatens 2 billion people and could create more than 135 million refugees. In Africa, if current trends of soil degradation continue, the continent might be able to feed just 25% of its population by 2025, according to Karl Harmsen, Director of UNU's Ghana-based Institute for Natural Resources in Africa. The international community should swiftly adopt adequate policies both to counter the desertification trend and to address desertification-induced migration. "Environmental refugees," although not recognized yet in world conventions, are estimated to outnumber political refugees.
[See also International Year of Deserts and Desertification—2006 in January 2006, and Desertification Synthesis (MA report 3) in June 2005 environmental security monthly reports.]
(December 2006) Ref. 670

Population and Resources Affecting the Risk of Conflict
The UN Population Prospects 2006 Revision report reveals that most of the countries that top the birthrate list are those already affected by the world’s worst wars. Growing pressure of people on land and resources is likely to exacerbate conflict in those areas. At a Woodrow Wilson Center event, ‘Demography and Conflict: How Population Pressure and Youth Bulges Affect the Risk of Civil War’, Henrik Urdal, Researcher at the Centre for the Study of Civil War, International Peace Research Institute, Oslo (PRIO), discussed the results of an empirical research on the links among global demographics and the potentials for civil unrest. Concluding that certain forms of population pressure—particularly youth bulges—increase the risk for conflict, he makes several recommendations for attempting to minimize conflict, including: measures to enhance local resource management capacity; programs aimed at curbing population pressure, and more research focusing on youth bulges and political stability and conflict prevention.

Another Woodrow Wilson Center event, ‘Climate-Security Connections: An Empirical Approach to Risk Assessment,’ analyzed the potential relationship between environment and conflict by integrating environment data with conflict data and using the results to improve
Conflict risk assessments. The outcomes show that although environmental scarcity doesn’t necessarily represent a cause of conflict, it might become an important reason in poor and war-torn societies or with other inter-group (horizontal) inequalities. Hence, it is important for preventing and mitigating escalating conflicts to map and watch different environmental anomalies that might lead to food and/or water scarcity and vice-versa and to identify conflict-prone zones that might be exposed to destabilizing environmental factors. Such a world map of areas worth watching for possible crises situations that might lead to conflict was presented. (March 2007) Ref. 671

**South Asian environmental migration**

A recent editorial summarized environmental migration issues in South Asia and suggested that there is an environmental migration vector in place between Bhutan and Nepal. [See also related item *Implications of Environmental Migration to National Security*] (April 2004) Ref. 672

UN “Programme performance of the United Nations for the biennium 2002-2003” notes that concerning natural disasters, “national capacity in the areas of disaster mitigation, preparedness, reduction of vulnerability and disaster management was strengthened in some 65 countries through the provision of assistance in the implementation of national action plans, projects and programmes, the development of strategies for regional consultation, the establishment of partnerships and the deployment of United Nations disaster assessment and coordination teams. The provision of 71 multinational training events at which government officials, at the local and national levels, of some 100 countries were trained, strengthened the officials’ ability to respond to natural disaster emergencies and facilitated the creation of networks to exchange best practices and lessons learned.” (April 2004) Ref. 673

**Rising Sea Level Triggers Rising Refugee Move**

Further to the Rising Concerns over Rising Seas item of the February 2006 report on the 11,000 inhabitants of Tuvalu facing the threat of the rising ocean level: now, seeing themselves as climate refugees, some Tuvaluans are leaving their Pacific island homes and moving their communities to safer ground in New Zealand, thus officially becoming environmental refugees. [See also Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels in January 2006, First People Displaced Due to Rising Sea Levels in December 2005.] (April 2006) Ref. 674

**SEA LEVEL RISE**

**Scientific Evidences and Possible Consequences**

According to the Center for Research on Epidemiology of Disasters, in 2008 there were 321 disasters, below the 398 annual average for 2000–2007. Nevertheless, the 235,816 people killed, and the $181 billion in economic losses were considerably higher than the yearly average for the same period. About 211 million people were affected, with the highest number of deaths in Asia, mainly due to Cyclone Nargis and the Sichuan earthquake. The largest numbers of disasters were recorded in China—26, the Philippines—20, U.S.—19, Indonesia—16, and Vietnam and India—10 each.

A NASA study based on five years of data shows that for every 1°C (1.8°F) increase in
average ocean surface temperature, there is a 45% increase in the frequency of the very high clouds associated with severe storms and rainfall. Senior Research Scientist Hartmut Aumann notes that at the present rate of global warming of 0.13°C (0.23 °F) per decade, the frequency of severe storms could increase by 6% per decade. (January 2009) Ref. 676

A compilation by a team of researchers from the University of Colorado at Boulder shows that when factoring in thermal expansion due to warming waters, total sea level rise could reach about 1–2 meters by 2100. They considered glaciological assumptions for sea rise expected from Greenland, Antarctica and the world’s smaller glaciers and ice caps. Along the same lines, the Abrupt Climate Change report by the US Geological Survey found that sea level rise could exceed forecasts, possibly reaching 150 cm by the end of the century, an estimate which itself might “likely need to be revised upwards” because it doesn’t fully count the ice flow processes. Jim Hansen, of NASA, also says that most estimates of sea level rise are too conservative, since climate system feedback could quickly accelerate ice melt, leading to a runaway collapse.

At the Poznan climate conference, a group of 43 small island states, saying that rising seas could wipe them off the map, called for tougher goals for emissions reductions and limiting global warming to a maximum of 1.5°C (2.7° Fahrenheit) above pre-industrial times, which is far lower than the EU suggested 2°C. “We are not prepared to sign a suicide agreement that causes small island states to disappear,” said Selwin Hart of Barbados, a coordinator of the alliance of small island states, referring to a too weak climate change agreement.

A sudden sea swell hit Papua New Guinea in December, affecting some 32,000 peoples and their livelihood. A UN Disaster Assessment and Coordination (UNDAC) team went to the area to assess first aid needs. (December 2008) Ref. 677

Satellite observations reveal that since 1993 sea level has risen by 3.3 mm a year, almost double the rate of the previous 50 years. While for 1993-2003, about half of the sea level rise was due to the oceans expanding as they became warmer and the other half was due to shrinking land ice, since 2003, about 80% of the annual sea level rise can be attributed to land ice loss from glaciers, Greenland, and Antarctica. (November 2008) Ref. 678

WWF’s report Climate change: faster, stronger, sooner estimates that sea levels’ rise by 2100 might reach more than double the IPCC’s maximum estimate of 0.59m. UN-Habitat’s State of the World’s Cities Report 2008/09: Harmonious Cities highlights the vulnerability of 10% of the world population that lives in low elevation coastal zones, mainly urban populations in deltas. Improving infrastructure is one of the essential first steps for reducing the impact of sea level rise on the population. UNDP predicts that there might be 30 million Bangladeshi refugees by 2050, due to sea level rise. Jakarta could be under water by 2025 due to groundwater mining and rising sea levels. Although Bangladesh’s landmass is increasing by 20 sq km annually as a result of deposits in the Bay of Bengal by big Himalayan rivers, they become inhabitable only after several years and the country’s existing landmass is being washed away faster than new land is being formed. Some islands, such as Kutubdia, are already becoming uninhabitable and the population has to relocate.

A new study by the University of New South Wales examining the effect of climate change on the Australian region from the Central Coast to Wollongong reveals that, by 2050, sea level rise is likely to be 40 centimeters, reaching 90 centimeters by 2100, threatening Sydney’s coastal habitats and infrastructure. It also notes that a 1 centimeter sea-level rise can cause up to 1 meter
of erosion on low-lying beaches. The full study is expected to be released in January 2009.

Dubai, Kuwait, and the Nile Delta would be significantly affected by a 1-meter sea level rise, warns Raymond S. Bradley, director of the Climate System Research Centre, suggesting reinforcement measures mainly around Dubai’s coastline. (October 2008) Ref.679

A study commissioned by the Dutch government recommends that the Netherlands should spend “an extra 1 to 1.5 billion euros per year” to 2100 (representing about 0.3% of the national income) since “The security challenge is urgent: the climate is changing, the sea level rising and river flows increasing while a quarter of dikes and dams do not meet the current safety norms.” The report predicts a sea level rise of between 0.65 and 1.3 meters (2.15 and 4.3 feet) by 2100 and up to four meters by 2200.

A team of US scientists concluded that it is very unlikely that sea levels would rise by more than 2m (7ft) by 2100, even if one factored in faster melting and flow of Greenland and Antarctic ice sheets and glaciers. However, paleoclimatologists at the University of Wisconsin-Madison, analyzing the prehistoric Laurentide ice sheet (today’s Greenland is an analog of those earlier climatic conditions) say that Greenland could melt faster than estimated based on contemporary trends, raising sea levels 1.3 meters by 2100.

The representatives of four Pacific island nations—Kiribati, the Marshall Islands, Palau, and Micronesia—called on delegates at the General Assembly’s annual high-level debate to increase help and adaptation actions. Kiribati’s President Anote Tong noted that his country has only several decades before the country’s islands become uninhabitable. Tonga’s Prime Minister Feleti Vaka’uta Sevele underlined that “climate refugees from some of the Pacific Island Forum countries is no longer a prospect but a reality, with relocations of communities due to sea level rise already taking place.”

Cities along the West coast of Africa from Mauritania to Cameroon will be underwater as a result of rising sea levels by the end of the century, environmental experts say. A separate report from South Africa says Cape Town has a one in five chance of severe flooding within 25 years as a result of global warming. (September 2008) Ref.680

Sea levels could rise four meters, making some Pacific islands uninhabitable within the next decade, warns Australian expert Will Steffen, head of the climate change unit at the Australian National University and science adviser to the federal Government. Tuvalu might be underwater by 2050. He says that polar ice sheets melting have been underestimated. West Africa’s 4,000-kilometre (2500-mile) coastline—from Senegal to Cameroon—might be dramatically changed by the end of the century due to rising sea levels of up to 2 cm (0.8 inches) per year that will damage fragile coastline strips, especially in low-lying and densely populated deltas. Among the cities worst hit would be the Gambian capital Banjul and Nigeria’s economic capital, Lagos, home to 15 million people.

Off the southern coast of Ghana, the ocean is rising steadily, forcing residents to move every few years. However, soon, some villages will have no place left to run, as the available properties are too expensive.

In Britain about 70 landmarks sites around the coastline are threatened by rising seas and coastal erosion, according to the National Trust. (July-August 2008) Ref.681

The Ocean Surface Topography Mission (OSTM)/Jason 2 mission to be launched in June will provide data for better understanding ocean currents and the rises in sea levels. Current marine
measurements show that sea levels have risen on average by 0.3 centimeters since 1993, twice that, in the whole 20th century. The Jason 2 mission is a partnership between NASA, the National Oceanic and Atmospheric Administration, the French National Center of Space Studies (CNES), and the European satellite agency EUMETSAT. (May 2008) Ref.682

A team of scientists from the University of Colorado-Boulder's Institute of Arctic and Alpine Research, INSTAAR, and the Russian Academy of Sciences estimates that by 2100 accelerating melt of glaciers and ice caps could cause 0.1–0.25m (4–9.5 inches) additional sea level rise. This rise might be doubled if the expansion of ocean water warming is factored in. (July 2007) Ref.683

A new study by Australian and US researchers shows that ocean waters are heating up 50% faster at the surface then previous estimates (including those in the IPCC report). This explains the more rapid than estimated sea level rise. They also underline that sea ice melting is not of great concern to sea level rise; nevertheless, land ice melting is: if it all melted, sea levels would rise 70m (however, fortunately, they say, 57m of those are locked up in Eastern Antarctica, which seems to be stable for 20 million years and is not affected much by global warming).

Rising sea levels and coastal erosion will render small Pacific islands uninhabitable by the end of the century. Anote Tong, president of the Republic of Kiribati, has appealed to the international community to take responsibility for relocating the country’s 97,000 citizens.

Bangladesh, the world’s most densely-populated nation, is at risk of disappearing under the water by the end of this century as result of ‘saline inundation’ in the inland region, and coastal erosion and flooding at the coastal area. India has already begun to take security measures against the expected mass migration.

Cities along Australia’s northern and western coastline became vulnerable to ‘the Venice effect’ with increased frequency of flooding during seasonal high tides, revealed scenarios outlined in more than 40 submissions to a federal inquiry on the environmental impacts of climate change on coastal communities. Climate models suggest that mean sea-level rises on the east coast of Australia could exceed global averages, said the Bureau of Meteorology.

A report by the Japanese Ministry of the Environment urges the government to consider the effects of global warming—mainly rising seas and stronger storms—in long-term strategies, such as urban planning. It also suggests that residents in vulnerable areas should be relocated to safer places. (June 2008) Ref.684

The coastline along the Pearl River Delta—China’s most economically dynamic region—is expected to be the worst hit by rising sea levels by 2050. Egypt is facing similar worries as rising waters of the Nile Delta threaten millions of people and Egypt's food supply. (August 2007) Ref.685

At recent UN meetings, low-lying states reiterated their call for increased action against global warming. The small island-state of Tuvalu could disappear in 30 to 50 years. Increased salinity and flooding could displace millions in Bangladesh. (September 2007) Ref.686

Bangkok, Thailand's sprawling capital of more than 10 million people might be submerged within the next 15 to 20 years, due to sinking ground and the seawater rising, warn experts. Bangkok is one of 13 of the world’s 20 largest cities at risk of being swamped as sea levels rise.
in coming decades, according to the Intergovernmental Panel on Climate Change. (October 2007) Ref.687

Rising sea levels, increasingly destructive and more frequent storms, erosion, and floods will cause some areas of Britain to sink into the sea over the next 30 years, warn some experts. It seems that some parts of the Norfolk and Suffolk coastline could not be saved, according to leaked findings of a study conducted by the UK Environment Agency and to be published in June 2008. A Department for Environment, Food and Rural Affairs spokesman said, “Spending on flood and coastal erosion risk management has nearly doubled in cash terms, from £307 million in 1996-97 to an estimated £600 million in 2007-08. The Government will further increase spending to £800 million in 2010-11.”

Erosion, flooding and permafrost thawing are also menacing some Alaskan areas and peoples’ livelihood. On the island of Kivalina, uncertainty and frustration raise tension among the 400 residents whose relocation is yet to be decided. (November 2007) Ref.688

WMO reports that global averaged sea-level in 2007 is estimated about 20 cm higher than the 1870 estimate. Satellite measurements show that, since 1993, global averaged sea-level has been rising at about 3 mm per year, considerably more than the 20th century average of about 1.7 mm per year.

At the Bali Climate Change Conference, small island states reiterated the catastrophic impacts that global warming and rising sea levels could have for their nations and called for swift action to reduce man-made causes and increase adaptation measures.

According to U.S. government reports, more than 180 Alaskan villages are in danger because of shoreline erosion and permafrost melting due to global warming. Some are in immediate need of moving, although there are no clear relocation plans, nor adequate funding.

The Climate Change: A New Threat to Middle East Security report by Friends of the Earth Middle East (FoEME) highlights that consequences of climate change—mainly rising sea levels and freshwater shortage could exacerbate security risks in the Middle East. Unless adequate adaptation actions, the large-scale consequences include threat to “national, regional, and global security” warns Nader Khatib, Palestinian Director of FoEME. (December 2007) Ref.689

A forecast model shows that coastal erosion might increase 2-5 times over the next 50 years due to rising sea levels and more powerful storms. One of the most affected areas seems to be Russia’s East Arctic coast, which might lose 5 to 15 meters per year in 2040-2045. Russia is already recording high retreat along its 50,000-km northern coastline because of permafrost melt and Arctic Ocean rising levels, waves and tides and subsequent thermal abrasion. About 33% of Russia's eastern Arctic coast also suffers from thermal abrasion. In some places, the coast’s annual retreat reaches 15 meters.

Along China’s 18,000-km (11,185 miles) coastline, sea levels have risen by an average of 9 centimeters (3.54 inches) over the past 30 years, and coastal waters are getting slightly warmer, reports the country’s State Oceanic Administration. The most affected is the northern part, where, over the same period, sea level rise reached 19.6 centimeters (7.72 inches) at Tianjin port city, and 11.5 centimeters (4.53 inches) at Shanghai, causing increasingly huge problems in highly populated areas. Meanwhile, the China 2007 Sea Environmental Quality Report reveals increased pollution of coastal waters as a result of human activity.
The situation of the small islands of Tuvalu becomes increasingly critical. While the highest point of the islands is barely over 4 meters, a typical high tide reaches about 2 1/2 meters and a King Tide can be over 3 meters high; the forecast is that they will get higher due to global warming. The seawater is also surging up through the coral that forms the islands, salinizing the soil and groundwater.

The level of the Mediterranean is rising rapidly and could produce “catastrophic consequences”, warns the study *Climate Change in the Spanish Mediterranean* by the Spanish Oceanographic Institute. Since 1990, the study estimates that the Mediterranean has risen between 2.5 and 10 millimeters (0.1 and 0.4 inches) per year, meaning that if present trends continue, the water levels will rise between 12.5 centimeters (5 inches) and 0.5 meter (20 inches) in around 50 years. Mediterranean water temperatures also rose by 0.12 to 0.50 degrees Celsius since the 1970s. (January 2008) Ref.690

Bangladesh, chair of the Least Developed Countries, insists that developed countries increase LDC’s access to investment, resources and technologies needed to adapt to climate change effects. Of more than $1 billion pledged at the 2002 Johannesburg Earth summit for improving preparedness of vulnerable countries, less than $180 million have been delivered, and no contributions were yet made to the investment fund set at Bali. Being the most at risk, LDCs demand to take an active part in the global climate talks. At Bangladesh’s request, Britain offered financial support for LDCs participation in negotiations and will host a conference in May addressing Bangladesh’s vulnerability. A one-meter sea level rise would flood about one-third of Bangladesh, affecting about 25–30 million people.

Recent data from the U.S. Geological Survey warns of the danger that rising sea levels over the next 50 years represent to the U.S. coastal population. Among the most threatened are the islands of California’s Sacramento-San Joaquin delta, the islands in Chesapeake Bay, parts of the Louisiana coast, and the New York subway system. However, the 5,000 residents of the California’s delta islands are likely to become the first environmental refugees in the United States. The threat is the result of the interplay of two factors both effects of climate change: rising sea levels, and increased rainfalls over snow in the Sierra Mountains as a result of warming temperatures, thus raising the risk of floods. (March 2008) Ref.691

**Rising Concerns over Rising Seas**
Several recent articles have again raised the threat of rising sea levels that could ultimately cause massive coastal and island destruction. A U.S. analysis of satellite data has indicated that the volume of ice falling into the sea from Greenland's ice cap has doubled over the past ten years, and that the current contribution of Greenland to oceanic level increase is 0.57 mm/year. Australian research has determined that the average level of the oceans has risen 19.5 cm since 1870 and the rate is increasing, with a prediction of a 31 cm rise by 2100. British reports suggest the possibility of a 5-meter increase over the next several centuries, and mention the effect of increased river outflows on ocean levels. (February 2006) Ref. 692

**Void in High Seas and Coastal Governance**
The Third Global Conference on Oceans, Coasts, and Islands, “Moving the Global Oceans Agenda Forward,” organized by the Global Forum on Oceans, Coasts, and Islands, took place at the UNESCO headquarters in Paris, January 24-27. Over 400 participants from 78 countries agreed to accelerate progress for achieving the international ocean policy targets, including
integrated ocean and coastal management, and examined two major emerging ocean policy issues: high seas governance and the effects of climate change on oceans and coastal environments. No international organization holds responsibility for tracking the progress of programs in integrated coastal and ocean management, and there is no regular collection of information on the social and economic well-being of coastal communities, where half of the world's population lives. (February 2006) Ref.693

**Coastline Erosion due to Rising Sea Waters Signaled Around the World**

Coastline erosion as one of the effects of rising sea levels is increasingly felt around the world by low-lying communities. Hundreds of people are being displaced on the Carteret Islands, Papua New Guinea, and millions are threatened along the shorelines from Sri Lanka and Bangladesh, to coastal Louisiana and England. Experts warn that England's coastline erosion might accelerate as global warming leads to rising sea levels and harsh weather. Over the next century, half of the 1,125 kilometer coastline in the administration of the National Trust charity—Britain's largest owner of coastline—is expected to be severely affected by erosion. Lyme Regis in Southwestern England is already threatened by rising seawaters that are carving away its harbor and coast. To this, should be added the increasing acidity of ocean waters—due to CO2 levels that are over the ocean's natural buffering capacity—dissolving calcium and therefore severely affecting marine ecosystems, especially coral reefs that are the main support to many geologically new islands. [See also Climate change–Research Documents Continued Global Warming Effects and Rising Sea Level Triggers Rising Refugee Move in April 2006 and other previous environmental security reports.] (August 2006) Ref. 694

**Small Low-laying Island States in Jeopardy**

During the recent meeting at the UN Open-ended Informal Consultation Process on Oceans and the Law of the Sea, Indonesia said it has lost 26 islands to climate change. (July 2007) Ref.695

Six of the 18 inhabited low-lying Australian Torres islands have little or no elevation and are in danger of being swallowed by the sea. The islanders are already suffering because of abnormally high tides, land erosion, shifting seasons, and increasingly scarce marine life that traditionally constitutes their food source. Aborigines and Torres Strait islanders regained ownership of their traditional lands in 1992. Already socially and economically marginalized, the roughly 7,000 people are unhappy with the lack of attention and care on the part of the Australian government.

The Ocean Surface Topography Mission (OSTM)/Jason 2 mission to be launched in June will provide data for better understanding ocean currents and the rises in sea levels. Current marine measurements show that sea levels have risen on average by 0.3 centimeters since 1993, twice that, in the whole 20th century. The Jason 2 mission is a partnership between NASA, the National Oceanic and Atmospheric Administration, the French National Center of Space Studies (CNES), and the European satellite agency EUMETSAT. (May 2008) Ref.696

If ocean waters keep rising, low-lying states might disappear, making entire nations (such as the 12,000 people of Tuvalu) become environmental refugees forced to resettle elsewhere. Small island states like Tuvalu may take legal action against high greenhouse gas emitters like the U.S. The situation of these island nations topped the agenda of the tri-annual gathering of the Pacific
Leaders Meeting (PALM) held in Okinawa, Japan, in late May. Acknowledging the critical situation of the small island countries, the leaders of 14 Pacific island nations and Japan, adopted the Okinawa Partnership Declaration, which considers a new approach to the dispatch of aid assistance. [See also Future Sea-level Rise will make Freshwater Brackish in March 2006, Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels in January 2006 and other related items in previous environmental scanning reports.] (May 2006) Ref. 697

Rising Sea Level Triggers Rising Refugee Move
Further to the Rising Concerns over Rising Seas item of the February 2006 report on the 11,000 inhabitants of Tuvalu facing the threat of the rising ocean level: now, seeing themselves as climate refugees, some Tuvaluans are leaving their Pacific island homes and moving their communities to safer ground in New Zealand, thus officially becoming environmental refugees. [See also Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels in January 2006, First People Displaced Due to Rising Sea Levels in December 2005.] (April 2006) Ref.698

Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels
Possible rising sea levels of over 30 centimeters by the middle of this century would drown or make uninhabitable several small Pacific countries. Although discussions related to the implications for the region's security have begun, there are no regional and/or international policies and procedures to address displaced populations from small island countries. (January 2006) Ref. 699

First People Displaced Due to Rising Sea Levels
Over 100 villagers of the Pacific island Tegua, in Vanuatu, were relocated to higher ground to be protected from aggressive storms and waves considered consequence of climate change. The move, done under a project entitled Capacity Building for the Development of Adaptation in Pacific Island Countries, might represent a first example of formal mass-displacement as a result of climate change. (December 2005) Ref. 700

Rising Sea Levels Claim First Inhabited Island and Threaten Coastal Populations Worldwide
Scientists emphasize that extreme scenarios—as effects of climate change—have to be integrated into the decision-making process. Latest estimates by climatologist Stefan Rahmstorf of the Potsdam Institute for Climate Impact Research show that the world's oceans may rise up to 140 cm (4 ft 7 in) by 2100 due to global warming, considerably higher then the 9-88 cm projected by IPCC. His study is based on air temperatures and past sea level changes rather than computer models. The scientist underlines that the different results obtained “with reasonable methods” show the serious uncertainty concerning sea level forecasts; however, there is compelling evidence that shore communities are particularly at risk.

Rising sea levels have submerged two islands in India's part of the Sundarbans—where the Ganges and the Brahmaputra rivers empty into the Bay of Bengal—and a dozen more islands in the area are at risk, threatening nearly 100,000 people who will have to be evacuated in the next decade. Lohachara, which had a population of 10,000 people, is the first inhabited island to disappear due to rising seas caused by global warming. The people of the Carteret Islands off Papua New Guinea also live under the continuous fear of stronger and more frequent rising tides threatening their entire livelihood and eroding their land. The islands are expected to disappear in about eight years. Similarly, whole island nations, from the Maldives to the Marshall Islands, vast areas of countries from Bangladesh to Egypt, and many coastal cities are at risk as sea levels
continue to rise. In Alaska, 184 out of 213 native villages are at some point affected by erosion and flooding due to global warming, threatening the culture and the very survival of the inhabitants. [See also Rising Sea Level Triggers Rising Refugee Move in April 2006, Rising Concerns over Rising Seas in February 2006, and other previous environmental security reports.]

(December 2006) Ref. 701

**UN Conference on Small Island States and Climate Change**

The International Meeting to Review Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, scheduled for 10-14 January 2005 in Mauritius, will address the impact of climate change on the environment, economic development, and security of the Small Island States and will examine the results of the last decade’s efforts to address the issue.

Note: Community Climate System Model, version 3 (CCSM3), a powerful new climate modeling system at the National Center for Atmospheric Research (NCAR) reveals that global temperatures may rise more than previously projected if humanity doesn’t act on reducing green gas emissions. (June 2004) Ref. 702

**Small Island States Adopt Position on Addressing Climate Change**

The UN meeting of Small Island Developing States (SIDS) held in Mauritius, January 10-14, concluded with the adoption of the Mauritius Declaration and Strategy that emphasizes the need for developing robust global early warning systems to protect against natural disasters, and measures and strategies to cope with rising ocean levels and other consequences of climate change. As part of fighting pollution, the SIDS asked for regulation of radioactive wastes transported through their national waters. (January 2005) Ref. 703

**Melting Sea Ice and Glaciers**

**Scientific evidences and possible consequences**

The University of Zurich’s World Glacier Monitoring Service published the latest data showing that alpine glaciers from the Andes to Alaska and across the Alps shrank twice as fast as a decade ago, losing on average 0.7 meters of thickness in 2007—the most recent data available. The experts warn that most glaciers will disappear by mid-century.

*Synthesis and Assessment Product 1.2: Past Climate Variability and Change in the Arctic and at High Latitudes* is a comprehensive synthesis of science literature about the Arctic, integrating research on the past 65 million years of climate change, with contributions from 37 scientists from several countries. The conclusions show that faster warming at the Arctic than other places in the Northern Hemisphere is expected to continue, with all its consequences—sea-ice retreat, rising sea levels, increased erosion, etc. Additionally, human activity might induce changes that would exceed documented natural variability and trigger serious transformations.

Despite earlier beliefs, all of Antarctica seems to be warming, reported climatologists in the article “Warming of the Antarctic ice-sheet surface since the 1957 International Geophysical Year” published in the journal Nature. The conclusions resulted from combining satellite observations over the entire continent with data from land weather stations for the past 50 years. Warming of the continent’s western side has been twice as rapid as the East Antarctica.
Researchers say that the amount of ice flowing out of Greenland this summer is nearly three times more than that lost last year. (December 2008) Ref. 706

Advanced computer models using new surface temperatures data showed that changes in temperatures at the poles over the 20th century could occur only if greenhouse gas emissions and ozone depletion are factored in. This improved understanding of how the ice sheets will evolve over this century, explained the team of scientists led by East Anglia’s Nathan Gillet. A report by the Dirección General de Aguas de Chile, the country’s official water authority, warned that the Echaurren glacier and other smaller glaciers near Santiago could disappear over the next half-century. The Echaurren glacier supplies 70% of Santiago’s water needs and is the main source for the Maipo River and its tributaries, the water sources for the region’s agriculture. Water scarcity might cause massive population displacement in central Chile. (November 2008) Ref. 707

Autumn air temperatures in the Arctic reached a record high this year, 5°C (9°F) above normal, revealed *Arctic Report Card 2008* by U.S. National Oceanic and Atmospheric Administration. The main reason is major loss of sea ice, which allows more solar heating of the ocean, as the region is warming up more rapidly than the rest of the planet. The report also noted that the Arctic Ocean is getting warmer and less salty as sea ice melts; sea level rose nearly 0.1 inch per year, one of the main contributors being Greenland’s considerable surface ice melting. According to data from ESA’s Envisat satellite, the thickness of sea ice in large parts of the Arctic declined by as much as 19% last winter compared to the previous five winters. WWF’s report *Climate change: faster, stronger, sooner* shows that the Arctic Ocean is losing sea ice up to 30 years ahead of IPCC predictions and summer sea ice could completely disappear between 2013 and 2040.

Kolahoi glacier, the only year-round source of fresh water for the Kashmir valley, is melting at an alarming rate and might be all gone in 10 years. As water stress threatens the livelihoods of millions, the perspective of lasting peace in the region disputed by India and Pakistan is becoming even more difficult. (October 2008) Ref. 708

The Northwest Passage has been ice-free since early August for the second year in a row and it’s the first year that both the Northwest Passage over the top of North America and Russia’s Northeast Passage are free of ice. Although the ice is the second lowest (after last year’s record), the US National Snow and Ice Data Center (NSIDC) says “some climate modelers expect to see nothing but open water within five years.” This is corroborated by Canadian scientists who report that Canada’s Arctic ice shelves are disappearing at an incredibly high rate. The greatest changes are occurring at the highest northern latitudes; this summer alone, five ice shelves along the northern Ellesmere Island had shrunk by 23%.

The report *Global Glacier Changes: Facts and Figures* by UNEP and the World Glacier Monitoring Service is a comprehensive analysis of the fluctuations of glaciers and ice caps worldwide and presents the overall trend of glaciers’ retreat. The report underlines that while excellent data exist for Europe and North America, monitoring should urgently improve for “some strategically important regions” as the Tropics, Central Asia and the Polar Regions, where data gaps undermine the ability to provide early warning and plan preparedness accordingly.
According to initial calculations, Greenland has lost 150 billion tons of ice a year in the last four years. The Danish–American project GNET is part of a scientific observation network for monitoring and providing estimates on Greenland’s ice cap melting rate.

A Spanish research study has revealed that Pyrenean glaciers might disappear by 2050. Glaciological calculations have shown that since 1990 rapid melting has caused total regression of the smallest glaciers and 50%-60% of the surface area of the largest glaciers.

Satellite images revealed that the Karakoram-Himalayan glaciers have been retreating at around 110 meters a year over the period 1978 to 2006 compared to the 30 to 34 meters previously reported. Among human activities that have caused the retreat are listed intense military activities at the Siachen Glacier region, along with dumping of chemical and human waste. The Karakoram-Himalayan glaciers are headwaters for Asia’s nine largest rivers, including the Indus, Ganges, Mekong, Yangtze and Yellow rivers. (September 2008) Ref.709

Experts at the World Water Week conference held in Stockholm warned of the rapid glacial melting and dramatic changes in rainfall in the world’s mountainous regions. Himalayan glaciers are retreating the most rapidly, said Mats Eriksson, of the International Centre for Integrated Mountain Development. Stretching across China, India, Nepal, Pakistan, Myanmar, Bhutan and Afghanistan, the Himalayas range constitutes a major source of water for some of the most populous parts of the planet.

Arctic Ocean sea ice might set another record low this summer, according to scientists at the National Snow and Ice Data Center, and to ESA’s Envisat satellite observations. The direct route through the Northwest Passage became almost free of ice, while the Amundsen Northwest Passage has been passable since July. (July-August 2008) Ref.710

Out of 14 research teams studying global warming impacts in the Arctic, 11 estimate retreat at least as extraordinary as in 2007, while the other 3 groups estimate ice extent heading back toward, but not equaling, the average minimum for summers since 1979, when satellite-based Arctic sea ice monitoring began. Five other groups chose not to issue a numerical estimate. The ongoing Study of Environmental Arctic Change, SEARCH, continuously presents updated information on ice assessments and explanations.

Meantime, some polar scientists believe that there is a 50% chance of a totally ice-free North Pole this summer. (June 2008) Ref.711

Arctic sea ice has declined by about 10% in the past decade, note scientists from the University of Colorado’s Center for Astrodynamics Research. They estimate that there is a 59% chance that this year in September the ice cover will reach a new record low, as currently the ice is thinner and younger than at any time since observations have been recorded. In September 2007, the extent of Arctic sea ice was the smallest on record.

Scientists are increasingly confident that human activity is the cause of the new weather patterns seen at both poles. Their findings are based on computer models that analyzed natural and human-caused variables, and were compared with the observed real conditions. The models revealed an ice-free Arctic by 2030—about two decades ahead of the predictions in the United Nations' Intergovernmental Panel on Climate Change reports. (May 2008) Ref.712

Ice caps and glaciers contribute 60% of the ice melting that is one cause of increasing sea levels. According to scientists from the University of Colorado-Boulder's Institute of Arctic and
Alpine Research, INSTAAR, and the Russian Academy of Sciences, the rate has been accelerating over the past decade and 28% of this comes from Greenland, and 12% from Antarctica. In the Andes, many of the lower glaciers might be gone over the next decade or so, raising concerns over water and power supplies, and thus affecting economic development and the fight against poverty in the region—mainly in Peru.

Scientists observing the modifications in Greenland are also warning of fast paced melting and increasing temperatures in the region. Arctic climatologist Konrad Steffen who spent the past 18 springs on the Greenland ice cap, noted that over the last decade, the average winter temperature rose by 7°F, and cracks and ice quakes are more frequent, as if Greenland is “coming apart.” The Greenland Climate Network established by Steffen serves climate scientists worldwide and is one of the main instruments used by scientists from 60 nations participating in interdisciplinary research focusing on the Polar Regions, during the International Polar Year. The Chinese Academy of Sciences reports that the Qinghai-Tibetan plateau is warming at 0.7°F a decade, and that the 18,000 square mile area covered by glaciers has shrunk by 30% over the past decades, threatening to dry up the Yellow River and thus causing more droughts, sandstorms and desertification. The Chinese government already had to relocate some of the local population. (July 2007) Ref. 713

Arctic sea ice shrank to the lowest extent ever recorded by satellite, and it might be close to reaching a “critical threshold”—which could mean that the region might be ice-free in summer in the next 10 to 20 years. The Tibet Meteorological Bureau reported accelerating melting due to rising annual temperatures at a rate of 0.3° Celsius (0.54° Fahrenheit) every 10 years. (August 2007) Ref. 714

This year, the area covered by sea ice in the Arctic shrank to its lowest level since satellite measurements began nearly 30 years ago. The U.S. National Snow and Ice Data Center noted that on Sept. 16, 2007, the Arctic sea ice reached a record low 4.13 million square kilometers (1.59 million square miles), 22% less then the previous record. Himalayan glaciers are melting fast in Indian Kashmir as a result of global warming, noted a report by ActionAid, On the Brink? Himalayan glaciers are the main source for Asia’s nine largest rivers; water levels of regional streams and rivers already dropped by two-thirds. Rajendra K. Pachauri, the Chair of the UN Intergovernmental Panel on Climate Change, warned that some one billion people could be threatened by water shortage in South Asia, China and Africa as result of melting glaciers. (September 2007) Ref. 715

Many studies are showing greater warming in the Artic than in the rest of the world and that the reduction in the sea ice extent has been much faster than global climate models predict. Douglas Bancroft, Director of the Canadian Ice Service, notes that the “overall extent was similar to what some of the models envisioned but decades in advance of when they expected that would occur. In fact, the summer of 2007 looked very similar to some climate model forecasts for 2030 to 2050.” One research station in the Canadian High Arctic recorded temperatures as high as 22°C on Melville Island, where the long-term average is 5°C. According to Walt Meir of the US National Snow and Ice Data Center in Colorado, the wider polar region may have experienced its hottest summer on record.

ESA’s Earth Explorer ice mission, CryoSat-2, to be launched in 2009, will be specifically designated for polar region research, with observations over three-years, providing conclusive
data on the rates at which ice cover is diminishing. To complement submarine and satellite measurements and determine with highest accuracy how rapidly Arctic ice is thinning, next year three British polar explorers will chart sea ice melt to better estimate when Arctic summer sea ice will vanish due to global warming. (October 2007) Ref.716

Rapid melting of Andes glaciers indicates that they might disappear by mid-century, threatening agriculture, drinking water sources, and hydroelectric plants. The livelihood of more than 11 million people living in growing cities of Bolivia, Ecuador, and Colombia is jeopardized. As some of the poorest countries of Latin America, they do not have the funds necessary for preparedness and for developing adequate infrastructure to cope with water scarcity and other related challenges. (November 2007) Ref.717

Scientists attending the American Geophysical Union meeting in San Francisco revealed that ice sheets melt faster then expected. The Arctic ice is shrinking and thinning at a much faster pace then expected and latest modeling studies indicate that the northern polar waters could be ice-free in summers within just 5-6 years. Similarly, the Greenland ice sheet melted at a record rate this year, the largest ever since satellite measurements began in 1979.

Scientists observed that over the past few years the speed at which some of Greenland’s glaciers flow towards the sea has doubled. They think that one factor might be the holes created in the ice due to warming, through which the water of melting surface ice is penetrating below the ice and thus speeding the flow of ice toward the open ocean. While Greenland's melt water presently increases global sea level by about a quarter of an inch per decade, an accelerated melt would seriously endanger world’s shorelines. (December 2007) Ref.718

Modifications of atmospheric energy transport, heat moving toward the North Pole, and changes in the vertical temperature structure might represent the accelerating factor of the Arctic warming, reveals the article Vertical structure of recent Arctic warming by a group of scientists from the Department of Meteorology, Stockholm University, Sweden, published in Nature. In recent decades, the near-surface Arctic temperature rise was almost double the global average, and the study found that during the summer, the Arctic upper atmosphere was warming up twice faster each decade, thus accelerating thawing of sea ice and snow. Increasing GHG emissions seems to be an influencing factor of the atmospheric heat transport.

Antarctica is losing almost as much ice as Greenland, according to data gathered by an international satellite network measuring the thickness of the glaciers. Analyzing 10 years data (1996-2006), the international team led by Eric Rignot of NASA’s Jet Propulsion Laboratory, Pasadena, CA, found that ice loss in Antarctica increased by 75% in the last 10 years. Mapping patterns of ice loss on a glacier-by-glacier basis, they remark that West Antarctica lost about 49 billion metric tons more ice in 2006 than the approximately 83 billion metric tons in 1996, and that total loss of ice from Antarctica in 2006 was enough to raise global sea level by 0.5 mm.

In September 2007 the Arctic ice cap had shrunk to 4.13 million square kilometers (1.6 million square miles), down from 5.3 million square kilometers in 2005, a loss about twice the size of France, notes Jean-Claude Gascard, coordinator of the European scientific mission Damocles, which is monitoring the effects of climate change across the Arctic. 2008 might be a critical year and could result in the loss of another million square kilometers, he added.

The IPCC is inviting scientists to submit material on both Antarctic and Greenland ice sheets, given the huge effect their potential simultaneous melting might have on sea level raise. The aim
is to gather information and evidence on the impact of global warming at the poles, and to assess potential consequences to be addressed in an eventual IPCC fifth report. (January 2008) Ref.719

The Japan Agency for Marine-Earth Science and Technology revealed that permafrost in Siberia is thawing at an alarming pace. In some areas the depth of the melted permafrost doubled compared to 2000. Thus the lakes and marshes expand, in some areas being about 3.5 times larger in 2007 than in 2000, consequently accelerating the melting process even more. The research also shows that the annual average ground temperatures at the depth of 1.2 meters from the surface rose gradually from minus 2.4°C in the period from 1998–2004 to minus 0.4°C in 2006. An additional negative result of permafrost melting is the release of high quantities of methane, further promoting global warming.

New research by climatologists from Bern University on ice cores from Greenland and Antarctica shows that Earth warmed faster in the 20th century than at any other time in the past 22 millennia, and concentrations of greenhouse gases are increasing at a faster rate.

UK scientists have found instability trends in the ice of part of West Antarctica, which could lead to a significant rise in global sea level. They warn that if the discharge of glacier ice into the sea continues, the Pine Island Glacier alone could raise global sea level by 25 cm and accelerate neighboring glaciers’ discharge, which could raise the sea by 1.5m. (February 2008) Ref.720

At the southwestern edge of the Wilkins Ice Shelf of western Antarctica, a chunk of ice with an area of about 400 sq km broke up into icebergs. This might trigger the disintegration of a larger part of the Wilkins Ice Shelf, which totals about 14,500 sq km, and is now connected by only a 6 km strip of ice.

According to data of UNEP’s World Glacier Monitoring Service (WGMS), the average rate at which the world’s glaciers are melting and thinning has more than doubled between the years 2004-2005 and 2005-2006. Analyzing data from around 100 glaciers, with continual annual data series for 30 reference glaciers since 1980, WGMS found that average ‘water equivalent’ loss has risen from 0.3 meter per year between 1980 and 1999, to about 0.5 meter per year after the year 2000, and estimates of 1.4 meters in 2006. Out of the 30 reference glaciers only one (Echaurren Norte in Chile) thickened in 2006 compared to 2005, while all the others shrank, with European glaciers being among the most affected. Glaciers represent the only fresh water source for millions of people around the globe. (March 2008) Ref.721

Melting ice caps because of global warming may trigger more volcanic eruptions, scientists estimate. Thinning ice and thus reduced weight on the earth’s crust changes the geological stresses inside the crust in general, and also intensifies the rate of magma melting, increasing the possibility of eruptions, explain scientists Carolina Pagli of the University of Leeds, UK, Freysteinn Sigmundsson of the University of Iceland, and Bill McGuire of University College London in the UK.

Arctic permanent ice shelves are breaking off or cracking at a higher rate than feared, noted polar ice researchers who accompanied Canadian Rangers on a patrol around Ellesmere Island. They estimate that the High Arctic ice shelves could all be fragmented in a matter of years. Another study, by scientists of the National Center for Atmospheric Research (NCAR) and Colorado State University (CSU), reveals that new Arctic sea ice is on average so extremely thin, that it melts under the sunshine of clear summer skies it once could survive. U.S. submarines’ readings reveal a 40% reduction in sea ice thickness since 1960.
The Arctic Climate Impact Science – An Update Since the Arctic Climate Impact Assessment report, produced for the World Wildlife Fund, presented to the Arctic Council, says that there could be factors contributing to climate change that were not even considered, since the real changes are happening much faster than predicted by computer models and scientists. The report estimates that the summer ice pack could be gone in 5 to 32 years.

Release of long-stored methane gas from the thawing of the Arctic is one of the phenomena that could have catastrophic warming effects. At the annual conference of the European Geosciences Union held in Vienna, Russian polar scientists presented evidence that the first stages of melting have already begun off the coast of Siberia, as well as on land in northern Siberia.

There is research underway for the use of this methane as fuel. The state-owned Japan Oil, Gas and Metals National Corporation announced that it wants to extract some 7 trillion tonnes of methane estimated to exist in Japanese coastal waters. However, there are fears that this might release huge volumes of gas with possible disastrous environmental consequences. (April 2008) Ref.722

New findings show that glaciers are melting fast around the world from Africa's Kilimanjaro—projected to completely disappear sometime in the next 20—50 years, to South America's Andes Mountains, Europe's Alps, and Asia’s Himalayas. Tibet's glaciers may disappear within 100 years, threatening hundreds of millions of farmers in China's western regions. (December 2006) Ref.723

NASA satellite observations revealed Greenland snow is melting faster then expected. In 2006, in some monitored areas there were 10 days more of melting snow than the average over the past 18 years. This is consistent with the pattern observed since 1988. "We need to do more. The situation is very dramatic," remarked European Commission President, José Manuel Barroso after visiting Greenland to personally observe the effects of global warming. The hunting and fishing season has shortened to four to five months compared to eight months a few years ago. The UN choice to celebrate World Environment Day 2007 in Tromso, the Nordic Norway city, was to stress the global environmental impact of melting ice and snow and the role of satellite technology in identifying and analyzing long-term climatic trends and changes in polar regions. (June 2007) Ref.724

Greenland’s ice melting rate had tripled between April 2002 and November 2005, compared to the rate between 1997 and 2003, according to research by Jianli Chen and colleagues at the University of Texas in Austin and published in the journal Science. Although controversial, the results definitely indicate that rise in sea levels this century will likely be higher than originally forecasted. "If the Greenland cap melted completely, it would raise global mean sea level by about 6.5 meters. If this were to occur, most of the world’s coastal regions would be subject to flooding," warn the authors. Meanwhile, the glaciers of Southeast Alaska are shrinking twice as fast as previously estimated, according to a study by Fairbanks and Juneau glaciologists, published in the Journal of Geophysical Research. Sea ice is also melting at a record pace near the North Pole, due to a record hot summer that arrived in many northern settlements a full month earlier, following an unusually mild winter and spring, say locals. Inuit peoples of the far north in Canada began ordering air conditioning. The town of Kuujjuaq, at about 1,500 kilometers north of Montreal, has purchased 10 air-conditioning units as the inside temperature reached 31° Celsius (88° F.) in late July. (September 2006) Ref.725
Ice is melting at an increasing rate around the globe, and scientists warn that this might indicate that the effects of global warming are showing up faster than previously expected. Based on the latest calculations, Greenland ice loss increased by 250% between May 2004 and April 2006 compared with the two years between April 2002 and April 2004, which translates to an equivalent global sea level rise of about 0.5mm (0.02 inches) per year. Likewise, 95% of the glaciers in southeast Alaska (stretching from Yakutat Bay to the Stikine Icefield in British Columbia) are thinning at twice the rate that was previously estimated, according to a new study. (September 2006) Ref.726

The National Snow and Ice Data Center reported that the North Pole ice melted again at a record rate this summer, meaning that the Arctic could be ice-free in summer far sooner than predicted a year ago. Similarly, based on data from Envisat’s Advanced Synthetic Aperture Radar (ASAR), European scientists determined that around 5%-10% of the Arctic’s perennial sea ice has been fragmented by late summer storms and the ice had retreated to the point of opening a navigation passage from northern Siberia or the Norwegian island of Spitzbergen to the North Pole. "If this anomaly trend continues, the North-East Passage or ‘Northern Sea Route’ between Europe and Asia will be open over longer intervals of time, and it is conceivable we might see attempts at sailing around the world directly across the summer Arctic Ocean within the next 10-20 years" says Mark Drinkwater of ESA’s Oceans/Ice Unit. New evidence also suggests that Antarctica has warmed about 1.4° per century—a fact that was masked at the end of the 20th century by large temperature variations. (September 2006) Ref.727

Siberia’s melting accelerates global warming. Scientists recently discovered that in the last three or four years the entire western Siberian sub-Arctic region has begun melting, transforming the world’s largest frozen peat bog into a watery landscape of lakes. This could cause the release into the atmosphere of huge quantities of methane, 20 times as potent a greenhouse gas as carbon dioxide. Consequently, Siberia’s melting, considered to be partially caused by global warming, becomes in its turn an accelerating factor of it. This finding follows a similar phenomenon of major expansion of lakes in Alaska's northern extreme, bordering the Arctic Ocean.

The Arctic Ocean could be seasonally ice-free within 100 years, concludes a new report by U.S. and Canadian scientists. Climate warming is causing thawing of Arctic glaciers and ice sheets, driving the Arctic system into an ice-free state for the first time in more than one million years. The researchers could find no natural processes that might slow or reverse the accelerating melting process. Indigenous people and animals of Alaska, Canada, Russia, Siberia, Scandinavia and Greenland, are already feeling the warming, but the consequences will be felt worldwide, mostly by the millions of people of coastal areas. The melting is an accelerating process. [See also Climate Change Updates; Antarctic glaciers shrinking accelerating, in April 2005 environmental security report] (August 2005) Ref. 728

Several studies have recently revealed that ice at both poles is melting faster than previously forecast. Using satellite technology, scientists found that sea levels rise by 0.4 millimeters a year, due to water pouring into the seas, mainly caused by the bulk loss of ice sheets. Although there is evidence that while the West Antarctic is thinning the East of the continent is thickening, and similarly, Greenland’s interior is becoming heavier due to more snowfall, while the edges are thinning, the overall melting is more. A model developed by the National Center for
Atmospheric Research (NCAR), also reveals that ice sheets and glaciers in the Arctic and Antarctic have been melting steadily. The model is based on observations of the Last Interglacial period when shifts in Earth's orbit caused the Arctic to warm by 3-5 °C and the sea level to rise by some 5 meters. The scientists note that half of the sea level rise predicted in 2001 by the Intergovernmental Panel on Climate Change (IPCC) to occur this century has already taken place in the past decade. They warn that passing the 560 ppm CO₂ concentration threshold in the atmosphere (now it’s about 380ppm) might trigger unpredictable changes with catastrophic consequences, and are calling for increased efforts to curb greenhouse gases emission and tackle global warming. (March 2006) Ref. 729

Recent studies show that breakup and melting of glaciers is happening faster than expected, increasing concerns over rising sea levels and threatening low-lying regions of the world. Sunlight previously reflected by ice will not be absorbed, hence furthering the warming effect. A new report by researchers from five U.S. and European institutes and universities analyzes the possible impacts of the rapid dynamic of glacial change in Greenland and Antarctica, warning that this could significantly speed up the melting of major ice sheets, worsening the present projections for the sea level’s rise. Recent models by the Max Planck Institute for Meteorology in Hamburg show that the average global temperature could rise by as much as 4.1° Celsius by the end of the century, melting sea-ice in the Arctic and raising world sea levels by 30 centimeters (12 inches). During the conference of Antarctic climate experts held by the Royal Society in London, Dr. Tony Payne Monday, professor of glaciology at the University of Bristol and co-director of the UK's Centre for Polar Observation and Modelling, warned that West Antarctica ice melting “would lead to a sea level rise of five or six meters (16 to 19 feet) around the world, or sufficient to cause effects such as the inundation of much of the state of Florida.” Such research will influence the Fourth Assessment Report from the Intergovernmental Panel on Climate Change, which is due to be published in 2007. [See also Melting of Permanent Frozen Areas Accelerates under Climate Change Issue in the August 2005 environmental security report.] (October 2005) Ref. 730

The latest report by the World Glacier Monitoring Service, Fluctuations of Glaciers (FoG) VIII, examining glaciers’ situation over the period 1995–2000, warns of a possible complete deglaciation due to the greenhouse effect in the next few decades. This would be a phenomenon "without precedent in the history of the Earth" notes the report. The conclusion is based on the direct proportionality observed between the losses of average annual ice thickness and accelerated global warming over the last two decades of the 20th century. The FoGs are published each five years since 1959, offering a comprehensive analysis and standardized information on changes in glaciers' conditions. (August 2005) Ref. 731

Two separate NASA-funded researches conclude that the glaciers in Antarctica are melting much faster than expected, and contain more ice than previously estimated, meaning considerable sea level rise in case they break up. (September 2004)

Antarctic glaciers shrinking accelerating. A joint study by the British Antarctic Survey (BAS) and U.S. Geological Survey (USGS) reveals that in Antarctica 87% of 244 glaciers studied are in retreat due to global warming, and that average retreat rates have accelerated over the past years. Antarctica contains more than 90% of the world's ice. Antarctic melting could dangerously raise sea levels, thus drowning low-lying island states and regions. (April 2005) Ref. 732
A recent study of climate change by Jonathan Gregory, of the Centre for Global Atmospheric Monitoring at the University of Reading, using modeling techniques and reported in *Nature*, paints a gloomy picture of the possible future course of global warming and the melting of large ice deposits, in particular, the Greenland ice cap, if rigorous efforts are not undertaken immediately to reduce greenhouse gases. Not starting for perhaps fifty years and taking place over several centuries, this could effect a 7m rise in the ocean level, flooding many populated areas. A most disturbing further conclusion is that the change could become irreversible. (April 2004) Ref.733

**Arctic Debate**

-- see also [Arctic Debate](#) in the section Security Implications Of Environmental Aspects

The Arctic Climate Impact Assessment (ACIA) report reveals that the Arctic is warming nearly twice as fast as the rest of the planet, with dramatic physical, ecological, social, and economic consequences for the whole planet. At least half of the summer sea ice in the Arctic is projected to melt by the end of this century, along with a portion of the Greenland Ice Sheet, possibly raising global sea levels by 1 meter by 2100 and 7 meters in the long-term, threatening millions of people living in coastal areas. The possible disappearance of summer sea ice endangers Arctic animal species such as ice-living seals and polar bears, with devastating consequences for local people for whom these animals are a primary food source.

*Impacts of a Warming Arctic: Arctic Climate Impact Assessment* is the result of four years of research by an international team of about 250 scientists, and was commissioned by the Arctic Council—a ministerial intergovernmental forum comprising the eight Arctic countries and six Indigenous Peoples organizations—and the International Arctic Science Committee—a non-governmental organization for facilitating arctic research. At its Fourth Ministerial Meeting held in Reykjavik, November 24, the Arctic Council failed to devise a plan to address the problem, as the U.S. delegation opposed including any specific recommendations in the council's joint declaration. The Arctic peoples and tropical islanders plan to create an alliance to campaign against global warming and lobby industrial nations to cut greenhouse gas emissions, even threatening to file official complaints against the U.S. (November 2004) Ref. 735

**Arctic Access, Territorial Claims, Energy Resources and Environmental Management**

Global warming is expected to increase access to the Northwest Passage and other Arctic areas. Canada announced the construction of up to eight Polar Class 5 Arctic Offshore Patrol Ships and the establishment of a deep-water port in the far North. A Canadian opposition party and some Canadian analysts say Canada should do much more to assure its sovereignty over the area. The status of some Canadian Arctic waters is not clear among the relevant neighboring counties with varying territorial claims in the Arctic. Russia planted its flag on the seabed 4.2 km below the North Pole to strengthen its claims over a large Arctic area. [See also *The Disputes over the Northern Territories Set to Continue* in June 2007, *New Canadian Strategies for Monitoring the Northwest Passage* in August 2006, and *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security reports.] (July 2007) Ref.736


**Arctic Debate Intensifies**

Debate over the Arctic ownership is intensifying, as Canada, Denmark, Norway, Russia and the U.S. are all building their political and legal cases to claim jurisdiction over different (sometimes overlapping) areas. Russia declared that the first results show that the Lomonosov Ridge is an extension of Siberia, thus backing the country's bid to take control of the region. Denmark sent scientists on a month-long expedition seeking evidence that the Lomonosov Ridge is a geological extension of Greenland. Canada is determined to defend its sovereignty over the region's Northwest Passage and some Arctic territory; “We either use it or lose it. And make no mistake, this government intends to use it,” said Canadian Prime Minister Stephen Harper. Canada is establishing an army training center at Resolute Bay (about 370 miles south of the North Pole) and a deepwater port on the north end of Baffin Island. “The Russians, Canadians and Danes all have overlapping claims in the polar region. It is unclear how this can be resolved,” said Øystein Jensen, a maritime law expert with Oslo's Fridtjof Nansen Institute. (August 2007) Ref.737

**Arctic Issues Still at the Debate Stage**

Officials from the Arctic coastal countries Canada, U.S., Russia, Denmark, and Norway met in Ilulissat, Greenland, May 27-29, 2008, to address issues related to the Arctic territory. The meeting concluded with The Ilulissat Declaration, by which the five nations reaffirm their commitment for applying the UN Law of the Sea “to the orderly settlement of any possible overlapping claims,” stipulating that there is “no need to develop a new comprehensive international legal regime to govern the Arctic Ocean.” Critics say that this opens the possibility for a polar “carve up” by the five countries. Other Arctic Council group nations (Sweden, Iceland and Finland) as well as the indigenous communities—who are the majority of the population within the Arctic Circle—were not invited to the meeting. Environmentalists and the indigenous groups call for an international treaty similar to the one for Antarctica, which bans all military activity and mineral exploitation. A UN panel is supposed to rule on Arctic control by 2020. By the Ilulissat Declaration, the Arctic coastal nations also agree to cooperate on scientific research, improving navigation safety, and development of environmental monitoring and disaster response systems. [See also *Arctic Disputes Continue* in March 2008 and other similar items in previous environmental security reports.]

However, there is speculation that Russia has the strongest position for increasing its influence in the region and support for its expansion claims. It has infrastructure along the North Sea Route (including ports), has for a long time performed extensive research and possesses essential knowledge about the region. Most of all, Russia has the most powerful fleet and military potential permanently deployed in the Arctic. Russia is also working on gathering more evidence to support its claim for territorial expansion under the Law of the Sea. (May 2008) Ref.738

**Canada to Begin Monitoring Traffic in Northwest Passage by mid-2008**

In view of increasing disputes over the Northwest Passage, Canada announced that it will begin monitoring the area’s sea traffic by underwater listening devices. Beginning in mid-2008, Canada's military will monitor ships and submarines using detection technology installed at Gascouyne Inlet on Devon Island, near one of the main arteries of the passage. Canada is at odds with Russia, Denmark, Norway and the United States over the Northwest Passage. (September 2007) Ref.739
Arctic Disputes Continue
An authoritative report, *Climate Change and International Security*, to the European Council, among other recommendations for addressing security issues in the new context of climate change, recommends “Develop an EU Arctic policy based on the evolving geo-strategy of the Arctic region, taking into account i.a. [inter alia] access to resources and the opening of new trade routes.” It notes, “The increased accessibility of the enormous hydrocarbon resources in the Arctic region is changing the geo-strategic dynamics of the region.” A recent U.S. survey revealed that the Alaska continental shelf might extend more than 100 nautical miles farther from the U.S. coast than previously assumed, therefore eventually giving the U.S. the right to claim access to extra seabed resources if it were party to the Law of the Sea treaty. In the meantime, the US-based Arctic Oil & Gas Company has filed a claim with the UN to act as the sole “development agent” in the Arctic region, with exclusive rights to extract oil and gas from the central Arctic Ocean currently beyond the territorial control of the polar nations. (March 2008) Ref.740

Arctic Northern Passage Opens New International Issues of Regulation
Thawing of the Arctic sea ice opens up the Northern Passage as an international shipping route, triggering international disputes over sovereignty and ecological implications. Although scientists, politicians, and environmental activists are increasingly warning about the complexity of the problem, no international regulations are yet in place for this fragile region. Alex Wolfe, from the University of Alberta and leading researcher on the Arctic, says that besides the sovereignty and ecosystem issues of the opening of the Northern Passage, there are also shipping safety problems that are not yet adequately addressed. As of our information, there are no international shipping standards or regulations in place for ecosystem protection for Northern navigation. Canada claims that the waterway is Canadian territory, while other countries consider it international waters. There is no international treaty dividing the Arctic between the eight countries with claims: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the U.S. This exposes the northern passages to other possible problems, such as: transportation of illicit materials and illegal immigrants and as a place and route for terrorism, as well as difficulty in solving eventual disputes over tanker accidents, contamination, and overfishing. In March 2006, Canadian military forces will begin Operation Nunalivut ("land that is ours" in Inuktitut, the Inuit language), over the Arctic islands and sea ice of the Northwest Passage. (February 2006) Ref. 741

Northwest Passage to Become “Canadian Internal Waters”
The Canadian government mounted an expedition to defend the Northwest Passage as Canadian territory. This is the largest Canadian expedition in 60 years in the Arctic, with troops traveling 2800 miles across the region that is changing rapidly as a consequence of climate change. In addition to sailing, the opening of the Northwest Passage is an opportunity for access to rich resources, including oil. Recent research suggests that the passage could become ice-free and open for navigation as soon as 2015. While Canada claims sovereignty over the region, it is at odds with other countries including Denmark and Russia who argue that the area is a continuation of their territory. [See also *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security report.] (April 2006) Ref. 742
Arctic Observing Integrated Network

*Toward an Integrated Arctic Observing Network*, by the Committee on Designing an Arctic Observing Network, National Research Council, discusses the need, scope, and implementation of an international observation system for the Arctic region. The Arctic Observing Network (AON) would coordinate existing national and international efforts for reliable and timely detection of conditions and variations in the Arctic for a better understanding of the arctic system’s functions and changes. The network would serve both scientific and operational needs, also contributing to other programs and research studies that help understand the consequences of arctic changes and thus improve decision-making and timely-action. (March 2006) Ref. 743

International Assessment of Arctic Pollution Triggers Action Plan

The European Environment Agency (EEA) and the United Nations Environment Programme (UNEP) have published a report on the environmental impacts of industrialization on the Arctic and its native peoples. The report, compiled by the UNEP GRID Arendal Centre in Norway, warns that the northern polar region faces a diverse range of threats from unsustainable development, pollution and climate change. By focusing attention on the Arctic, the report specifically attempts to facilitate successful implementation of the EU’s second Northern Dimension action plan, covering 2004-2006. This document focuses on five priority sectors: economy and infrastructure, social issues (including education, training and public health), environment, nuclear safety and natural resources, justice and home affairs and cross-border cooperation. Within each of these sectors, it sets out strategic priorities and specific objectives, and indicates the priority actions to be pursued in achieving these objectives. Although the action plan's geographical priority is the Baltic area, it has the potential to address circumpolar and global issues affecting the resources and environment of the entire Arctic. The action plan, which includes a focus on sustainable development, is expected to play an important role in developing cooperation between the EU and regional bodies related to the Arctic, such as the Arctic Council. Specifically, its environmental provisions include (1) enhanced cooperation of all partners to ensure convergence of environmental legislation, standards and norms throughout the region, including Environmental Impact Assessment, (2) enhanced commitment of all partners for the implementation of the HELCOM Copenhagen Declaration on maritime safety and reduced pollution and the rapid ratification of the Kyoto Protocol; the UN/ECE Espoo, Aarhus and Stockholm Conventions; and the UN/ECE Convention on Transboundary Watercourses and International Lakes, (3) cooperation on Kyoto Protocol implementation, (4) enforcement or development of national legislation ensuring convergence with European regulations or directives on chemicals, toxic and urban waste, water and sea pollution, and safety of oil transport by sea, and (5) implementation of the Arctic Council Action Plan to Eliminate Pollution in the Arctic. (March 2004) Ref. 744

Mission to Study Arctic Environmental Changes

The UN launched a two-year scientific mission in the Arctic to monitor changes in global climate, thinning of the ozone layer, and impacts of chemical pollution. There is evidence that the Arctic climate is warming rapidly and that more serious changes are looming, which, although with global effect, would most drastically affect indigenous communities and polar biodiversity. (July 2006) Ref. 745
Disputes over Polar Regions Expands
The race for claiming polar territories expends from the Arctic to Antarctica. The Antarctic should be protected by the 1959 Antarctic Treaty and related agreements that protect the continent against activities relating to mineral resources except scientific ones. Nonetheless, Britain’s Foreign Office plans to claim 1 million sq km (386,000 sq miles) of seabed off the coast of the British Antarctic Territory. Greenpeace and WWF warned that Britain’s possible oil, gas, and mineral exploration in the region would represent an environmental disaster for the fragile ecosystem. Similar claims for seabed areas might also be submitted by Chile and Argentina, which might overlap some of the British territorial claims.

Meantime, the Arctic disputes continue. Encouraged by the prospect of increased oil and minerals access due to global warming, Greenland is contemplating eventual independence from Denmark. Warning that climate change is becoming a threat to worldwide peace and security, German Foreign Minister Frank-Walter Steinmeier noted with concern that the rival territorial claims in the Arctic could turn into a Cold War. “Policies to fight climate change can, and will, become an important part of peace policies,” he added. Note: On August 21st this year, for the first time on record, the Northwest Passage was opened to ships not accompanied by or armored as icebreakers. [See also Arctic Debate Intensifies in August 2007, Arctic Access, Territorial Claims, Energy Resources and Environmental Management in July 2007, and other similar items in previous environmental security reports] (October 2007) Ref. 746

International Polar Year 2007-2008
The International Polar Year, the largest polar research program for 50 years, officially started on 1 March 2007 and will involve thousands of scientists, from more than 60 countries, working on 220 projects focused on the Arctic and Antarctic regions. Its purpose is to enhance the understanding of physical, biological and social processes of those regions, and Earth’s climate and ecosystems. The outcomes are expected to improve assessments and forecasts, and eventually generate recommendations for further research and policies. In 2009, after the IPY ends, ESA will launch the Cryosat 2 spacecraft to continue monitoring the Polar Regions mainly for changes in the thickness of the polar ice sheets and floating sea ice. (March 2007) Ref. 747

Stricter Measures to Protect Polar Regions Expected
The International Polar Year 2007 is expected to intensify research and discussions concerning climate change and its relation and effects to the Polar Regions. The Edinburgh Declaration was adopted this month by the participants in the Antarctic Treaty Consultative Meeting. It pledges full political and financial support for scientific projects and assessment of existing and/or possible new regulations to protect the Polar Regions. Some 300 scientists and legal and political advisors from 45 countries Party to the Antarctic Treaty participated in the Treaty’s Consultative Meeting in Edinburgh. They also agreed that the Treaty’s next meeting in April 2007 in India would develop a code of conduct or minimum standards for those traveling to the Antarctic. Thousands of scientists from 60 countries will be conducting research during International Polar Year 2007-2008. They will have access to satellite data that cover the complete areas of the Polar Regions for the first time. Ref. 748

First Species declared Endangered Due to Global Warming
Polar bears were declared a “threatened” species under the U.S. Endangered Species Act, becoming the first species officially designated in danger of extinction because of global
warning. Environmental groups are not pleased with the new regulation, since important greenhouse gas emission-related activities, such as offshore oil and gas exploitation, are exempted from compliance with the law. [See also Melting Glaciers and Sea Ice in August 2007 and other similar items in previous environmental security reports.] (May 2008) Ref.749

**FOOD AND FRESHWATER**

Water tables are falling on all continents, 40% of humanity depends on watersheds controlled by two or more countries, and the damaged carrying capacity of land may lead the poor to migrate to richer areas—increasing conflict potentials. Even with intensified global action, environmental disasters and degradation will continue in many regions of the planet, and the poor are the most vulnerable.

**Climate Change and Access to Water Addressed as Human Rights**
The seventh regular session of the Human Rights Council adopted 36 resolutions on a wide range of issues, including two major reports to be delivered in three years to the tenth session of the Council: one on water as a human right, and another on the relationship between climate change and human rights. In the meantime, 2008 is the 60th anniversary of the Universal Declaration of Human Rights, which will also increase reflections on these two topics. (April 2008) Ref.751

Proposal for Recognizing Water as a Basic Human Right
The declaration of the first Meeting of the Parties to the Protocol on Water and Health to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes includes a paragraph on water as a basic human right. The meeting adopted several decisions, mostly related to the implementation and compliance procedures of the Protocol, transparency, and involvement of local authorities into the Protocol's implementation at early stage. The European ECO-Forum proposed the development of guidelines for governments (national and local authorities) to help in the implementation of the Protocol and urged that they be adopted at the Second Meeting of Parties that would be hosted by Romania in 2010. The first meeting was held January 17-19, 2007 at the Palais des Nations, in Geneva, Switzerland. The Protocol entered into force on August 4, 2005 and as of January 2007, has been ratified by 21 countries. (January 2007) Ref. 752

Access to Clean Water Treaty
Mikhail Gorbachev wants the UN World Summit in September to declare that access to safe water is a human right and embody this right in a new international treaty. His speech at the 13th meeting of the UN Commission on Sustainable Development called for a legally binding treaty with adequate implementation mechanisms to guarantee the right to clean water and sanitation to all. This former head of the Soviet Union declared that providing clean water for everyone is a bigger challenge than ending the nuclear arms race during the Cold War. (April 2005) Ref. 753

**Food Scarcity Issues**
Half the world’s population might face food crises by 2100, warns a team of scientists from Stanford University’s Program on Food Security and the Environment. The main cause is a combination of climate change and water shortage, reducing crop yields in the tropical and subtropical regions (between about 35° north latitude and 35° south latitude) where the world’s fastest-growing and poorest populations are. They suggest rethinking the whole agricultural system in view of the new environmental and demographic trends.

The number of hungry people increased by 40 million in 2008, said FAO, but $30 billion a year investment in infrastructure and agricultural production could eliminate the root causes of hunger by 2025. This represents only 8% of the support to agriculture by OECD countries. In sub-Saharan Africa only 4% of the arable land is irrigated (compared to 38% in Asia), and only 3% of renewable water reserves are used.

Before the high level meeting, “Food Security for All,” held in Madrid, January 26-27, the ETC Group released a Communiqué on global governance of food and agriculture. It suggests that the four main agencies (FAO, CGIAR, IFAD, WFP) should coordinate and work together along with smaller more specialized organizations from the developing countries.

The UK created a new Food and Environment Research Agency (FERA) by merging several Defra agencies and thus better integrating food and environmental security research and policy.

Indonesia’s rice production was very good in 2008, but inefficient implementation of land reforms and improvement of economic conditions of farmers led to numerous conflicts.

In Africa, by 2020, water shortages might affect 250 million people, and agricultural productivity could decline 50%. These points were stated at the two-day meeting organized by the UN Office for the Coordination of Humanitarian Affairs (OCHA) and the African Union (AU), aimed at developing a continent-wide policy framework to protect pastoralists in Africa. (January 2009) Ref. 755

FAO’s Crop Prospects and Food Situation report warns that some 33 countries around the world are in need of external food assistance as a result of crop failures, conflict or other forms of food insecurity and high domestic food prices. Although cereal harvests in 2008 reached record highs, with wheat and rice production at over 2 billion tons—more than a 5% rise over 2007, most increases were achieved in richer nations.

Martin Parry, former co-chair of an Intergovernmental Panel on Climate Change (IPCC) working group and lead author of its 2007 report, calculated that the more the year of greenhouse gas emissions reduction is delayed, the higher will be the negative impact on food and water supply, health, coastal areas, and other ecosystems. His study reveals that even in the best-case scenario, 1.7 billion people will face water shortage due to climate change already taking place. This could potentially reach 3.2 billion, if action is delayed. Similarly, crop productivity will be affected through more frequent and more severe droughts, floods, and storms.

In Africa, as 21 countries are affected by food crises, governments should double the percentage of national budgets allocated to increase farm output, improve water sharing, and adopt policies to adapt to climate change, agreed ministers attending a water conference in Libya. Africa’s population of 967 million, of whom 53% are under the age of 20, is forecast to reach 2 billion in 2050. The UNDP Poverty and Environment Initiative implemented in Malawi and other 10 African countries aims to address food security by including environmental objectives such as combating soil erosion, deforestation, and water pollution in development programs.
Low Carbon, High Growth: Latin American Responses to Climate Change estimates that without adequate actions, climate change might reduce farm revenues by 12%–50% by 2100. Climate Change and Food Security in Pacific Island Countries, a report by FAO, the Secretariat of the Pacific Regional Environment Programme, and the University of the South Pacific, notes that the region’s food security is seriously affected by natural disasters. Therefore, says Alexander Müller, FAO Assistant Director-General, Natural Resources Management and Environment Department, “integrating climate change adaptation into national policies, strategies, programmes and budgets related to agriculture, forestry and fisheries should become a major priority.” In the Solomon Islands, food security and livelihood of villagers of Luihua and Pelau, are already affected by continuous tidal surge onto the land, reports the Ministry of Home Affairs and the National Disaster Management Office.

The UK set up the Council of Food Policy Advisers in order to address the growing concern of food security and find strategies to feed the world’s growing population. Professor Lang, member of the newly formed Council, lists “new fundamentals” that will shape future food production, including: oil and energy price volatility; water scarcity, through auditing foods’ water requirements; biodiversity replacement and enhancement by changing practices of land use and food growing; urbanization; and complete use of produce independently of appearance. (December 2008) Ref. 756

About 960 million were malnourished and over 100 million people worldwide were driven into poverty this year due to the food and fuel crisis. The World Bank warns that the situation will continue to get worse as unemployment rates rise, commodity prices remain volatile, and governments face shortages in public money and outside financial assistance. The financial crisis is eclipsing and aggravating the food crisis. Production is threatened by: farmers’ increasingly difficult access to credit, high input costs, and a growing monopoly over seed and agrochemical sales.

“The impact of natural resource degradation is potentially even more devastating in financial terms than the current global meltdown,” said Christian Mersmann, Managing Director of the Global Mechanism of the UN Convention to Combat Desertification, at the seventh session of the Committee for the Review of the Implementation of the Convention. Some 12 million hectares of land are lost yearly due to degradation and environmental causes. Desertification threatens regions that are already the most vulnerable: 65% of agricultural lands in Africa—where 60% of the population depends on agriculture, and nearly 70% of the Arab region.

Countries still strongly affected by food crises include Kenya (where officials have been accused of artificially creating a maize shortage), Zimbabwe (where the political impasse has only made the situation worse), Afghanistan (where attacks on food convoys amplify food insecurity), Swaziland (threatened by another year of drought), Haiti (where 26 children have died in just four weeks from malnutrition), Bangladesh (where broken dams have flooded 13 Khulna villages), North Korea (where there are signs of massive malnutrition despite efforts to hide the evidence), West Africa (where the UN is seeking US$361 million to solve the crisis), and the horn of Africa (with 12 million hungry in Ethiopia, 3 million in Somalia, 2 million in Kenya and Uganda, plus more in Eritrea and Djibouti).

In Latin America, the UN Economic Commission for Latin America and the Caribbean (ECLAC) projects that 10 to 15 million more people could slip below the poverty line in 2008 as a result of food price volatility. (November 2008) Ref. 757
The food crisis continues in many countries, particularly in North Korea, Somalia, and Zimbabwe, where the situations have been called humanitarian crises. Hunger in Latin America has risen from 45 million in 2006 to 51 million today. Chinese experts warn that the country’s food production might drop by 23% by 2050 due to climate change.

World Food Day focused increased attention on the seriousness of the situation, but much attention is diverted by the financial crisis. The credit crisis is aggravating the food crisis as countries like China institute new export taxes to keep their crops and fertilizers in the country, causing the costs of these goods to rise elsewhere. New trade agreements, like the Thailand and Iran barter of oil for rice, reveal new types of reaction to the fluctuating prices of commodities. Leaders worldwide are calling for action on the food crisis, such as the Asia-Europe Meeting recommending coordinated action between Europe and Asia. A new council was set up in Britain to look at food security.

Middle East water scarcity-related issues are aggravated as the Sea of Galilee, Israel’s largest freshwater lake, vanishes, threatening the livelihoods of local communities. About 50% of Israel’s drinking water comes from the lake, water is already rationed, and its agricultural use is increasingly reduced, jeopardizing food production.

In Bangladesh, drinking water becomes saline as rising sea levels force salt water further inland. In Zimbabwe, the conflict situation over water has started, as some communities’ local rivers are drying up. (October 2008) Ref.758

The World Bank warns that the global food crises will be long-term as climate change, energy, and water scarcity intensify. In Africa, 100 million people are at risk of moving back into poverty. The International Water Management Institute (IWMI) argues that the world is facing not so much a food crisis as a water crisis, which might intensify, as water is likely to get scarcer due to global warming and increased demand. (September 2008) Ref.759

The food crisis continues to deteriorate. Malnutrition in India will get worse as the country may lose up to 17% of its farming income due to climate change. India and Cambodia are promoting the use of rat meat to offset the food crisis. Bangladesh might lose some 30% of its food production by 2050. The island of Mindanao in the Philippines may experience a food crisis as internal conflict forces displacement of many. Tropical storms in Haiti such as Fay worsen the food crisis, triggering new protests. UN agencies say that 50% of Somalia will be totally dependent on food aid and emergency assistance over the next year. UNICEF says that food shortage might affect up to 70% of rural population in the south, with one in six children suffering from acute malnutrition. South Africa might have its maize crop reduced by 20% within 15 to 20 years as drought worsens in the west, while the east is increasingly afflicted by severe storms.

Three successive years of drought in the West Bank and restraint on movement brought some 50,000 Bedouins and herders to the brink of emergency, says the International Committee of the Red Cross, which helps them face an acute water shortage. This is aggravating Palestinian frustrations over the control of water resources in the Israeli-occupied West Bank. In Afghanistan, though, the food crises might help the government and international community efforts in encouraging the replacement of poppy crops with food crops, tackling both the drug trade and the food crisis.

Meantime, UNCTAD notes that while the world tends to address the urgent humanitarian aspects of global food crisis, attention should be focused on the structure of trade and development policy
that underlies the crisis. Similarly, some analysis papers state that the world is producing enough to feed its population, but one of the major problems behind the food crisis is that as much as half of all food grown is lost or wasted (which means also wasted water). A policy brief, “Saving Water: From Field to Fork – Curbing Losses and Wastage in the Food Chain” produced by FAO, the International Water Management Institute, and the Stockholm International Water Institute, calls on all actors in society to reduce food waste by half, by 2025. (July-August 2008) Ref.760

Continually Rising Food Prices Threaten Long-Term Global Stability. According to UN data, global food prices rose 35% this year and have already risen 65% since 2002. Biofuels competition for land and water, climate change, oil prices, and increasing population and incomes all contribute to the long-term increases in food prices. The Food and Agriculture Organization found that dairy prices rose nearly 80% and grain 42% in 2007. With nearly 3 billion people making $2 or less per day, long-term global social conflict seems inevitable without more serious food policies, scientific breakthroughs, and dietary changes. (March 2008) Ref.761

As the food crisis intensifies around the world over the past few months, an additional 100 million people began suffering from hunger and there were food riots in some 30 countries, including recently conflict-torn countries such as Haiti, Côte d'Ivoire, Senegal, and Somalia. Some argue that the Security Council should consider the issue in order to stop escalation into larger global security crises. "The Security Council would be remiss in carrying out its responsibility for maintaining peace and security if it fails to take the much needed preemptory steps to stop further deterioration of the security dimensions of the global food crisis," says Anwarul Karim Chowdhury, a former Bangladeshi ambassador and UN High Representative for Least Developed Countries (LDC). He compared the food crises to others—such as HIV/AIDS— that were discussed at the Security Council level and recalls that the bodies dealing with the food situation (ECOSOC and FAO) do not have security-related mandates.

Secretary-General Ban Ki-moon announced a new international UN Task Force on the Global Food Crisis, composed of the heads of key UN agencies and institutions, to prepare a comprehensive plan of action to tackle the global rise in food prices. The elements of the task force’s plan will be presented at the UN and FAO High-Level Conference on World Food Security, Climate Change and Bioenergy to be held in Rome, June 3-5, 2008.

The International Planning Committee for Food Sovereignty suggests the creation of a UN Commission on Food Production, Consumption and Trade, as a more inclusive mechanism to replace the UN Task Force. It also advocates that the food emergency situation should override previous trade and international agreements and a new trade dialogue should begin under the auspices of the UN.

At this time, when food security threatens stability around the world, a few agricultural biotechnology companies are trying to concentrate corporate power, gain a monopoly over a large part of global food, undermine small farming and farmers rights, and most likely drive up costs. “Globally, the top 10 seed corporations already control 57% of commercial seed sales. This is a bid to capture as much of the rest of the market as possible,” explains Hope Shand, Research Director of ETC Group. According to ETC Group’s report, Patenting "Climate Genes"...And Capturing the Climate Agenda, Monsanto, BASF, DuPont, Syngenta, Bayer and Dow—along with some biotech partners—have filed 532 patent documents on genes related to environmental stress tolerance at patent offices around the world. In the meantime, poor
countries complain that unfair policies are threatening their local seeds, undermining agricultural productivity and jeopardizing national food security. Some Indian farmers are giving up planting rice, because it is not cost-effective anymore, due to the high prices of fertilizer, seeds and pesticides.

Global warming is most probably the cause of changing rainfall patterns in Australia, concluded scientists gathered to discuss recent findings by the South-Eastern Australia Climate Initiative (SEACI). Assessing specifically the decline of rainfall and inflows into the Murray-Darling river systems over the past decade, SEACI, a three-year project that began in 2006, reveals that the Southeast Australian water system will most likely be increasingly stressed in the future as rainfall is expected to be significantly reduced, concomitantly with suspected warmer temperatures. Dr Wendy Craik, chief executive of the Murray-Darling Basin Commission, notes that in some parts of the basin the drought is more severe than the worst climate change predictions for 2055. Since future prospects are not encouraging, drought-adaptation strategies should be considered. (May 2008) Ref.762

UN Food and Agriculture Organization warns that world food supply is diminishing rapidly and food prices reached historic highs, increasing the “very serious risk that fewer people will be able to get food,” particularly in the developing world. FAO records show that world grain stock—corresponding to the world’s total consumption—declined to 12 weeks for wheat and only 8 weeks for corn. Population growth, the effects of global warming and increase of biofuels industry are among the main factors. Josette Sheeran, executive director of the World Food Program expressed concerns that we are “facing the perfect storm for the world’s hungry.”

New computer projections also warn of possible future crop production reduction due to climate change. NOAA models show the effects that climate changes could have on the tropical belt and the possible consequences to ecosystems and human settlements. New projections by the Massachusetts Institute of Technology indicate that unless there are serious emission cuts, ozone pollution might increase 50% by 2100, which could result in a decrease of global economic value of crop production by 10% to 12%. Nevertheless, the present situation shows that changes are happening faster then computer-based climate simulations have forecast.

Three studies coauthored by researchers from prestigious organizations in North America, Europe and Australia, published by the National Academy of Sciences, warn that the future food situation might be worse then presently estimated, since many parameters that would influence crops were not efficiently factored in. “Many people assume that we will never have a problem with food production on a global scale. But there is a strong potential for negative surprises,” said Francesco Tubiello, a physicist and agricultural expert at NASA's Goddard Institute of Space Studies, who coauthored all three studies. (December 2007) Ref.763

The number of riots is likely to rise around the world as the number of people at risk of malnutrition grows due to commodity prices’ increase, warn UN officials. The WFP, which feeds 73 million people in 78 countries (representing less than 10% of world’s total undernourished) noted that it will face serious difficulties this year in helping to mitigate malnutrition. Food prices rise rapidly, driven mainly by decrease of supply as harvests are reduced by climate change effects (drought, floods, and extreme weather conditions); increasing food demand from countries such as China and India; increasing demand by the biofuel industry; and soaring oil prices. Additionally, the governments of some important food-exporting countries tend to put restrictions on exports, in order to assure their own food security.
Using computer models, analysts assessed how the 12 most food-vulnerable areas are likely to be affected by climate change in the next 20 years. This included the regions where most of world’s malnourished people live: much of Asia, sub-Saharan Africa, and the Caribbean and Central and South America. The findings reveal that South Asia and southern Africa are the areas where climate change could cause severe crop losses, unless intense adaptation strategies are undertaken. The study also identified the likely effects by crop, therefore providing governments and aid agencies important information for building a comprehensive adaptation approach.

Food’s Failed Estates = Paris’s Hot Cuisine; Food Sovereignty – à la Cartel? by ETC Group analyzes food security prospects and policy failures and needs. It looks at all aspects that might drive food out of the reach of the marginalized, and warns that, without adequate action, the number of hungry people could increase by 50% by 2025.

The west of North America is seriously threatened by possible future lack of access to fresh water, as snowpack across the mountain ranges is shrinking, according to a computer analysis published in the journal Science. Using a complex system of factors’ interplay, the results show that up to 60% of the climate change trends in the area are human-induced.

The World Wide Fund for Nature - South Africa (WWF-SA) is warning the country’s government about a “looming water crisis for South Africa in the same way that it was warned a decade ago about the present energy crisis.” The country already uses 98% of available water resources and it could run out of water by 2025. (February 2008) Ref.764

An EU report, Climate Change and International Security [see item 8.1], warns that water scarcity and food insecurity caused by rising prices and diminishing harvests, particularly in the Middle East, are likely to cause “serious security risks” for Europe and internationally.

African Environment Day, organized by the African Union (AU) Commission to raise awareness of the impact land degradation and desertification have on Africa’s development, was observed under the theme “Adapting to Climate Change for Livelihood Security in Africa.” (March 2008) Ref.765

Continuous escalation of food prices worldwide increases distress in poor regions, raising the danger of social and political unrest. Demonstrations and/or riots due to unaffordable basic needs have already erupted in Egypt, Cameroon, Haiti, Burkina Faso, Indonesia, Ivory Coast, Mauritania, Mozambique and Senegal. FAO says that six countries have an “exceptional shortfall” of food supplies: Lesotho, Somalia, Swaziland, Zimbabwe, Iraq, and Moldova, while another six suffer of “widespread lack of access” to food: Eritrea, Liberia, Mauritania, Sierra Leone, Afghanistan and North Korea. Out of the estimated ~40 countries at “food crisis” risk, some 20 are or were recently affected by internal conflicts, and 21 have suffered from floods, droughts, and other weather disasters.

The International Assessment of Agricultural Science and Technology for Development Synthesis Report presents statistical analyses of basic food prices, an assessment of the state of world agricultural regions and threats to production; suggests several strategies and methods to increase agricultural efficiency, such as how to produce food that is less dependent on fossil fuels and favors natural fertilizers and traditional seeds; and offers suggestions for rational use and preservation of soil and water supply.

The International Federation of Red Cross and Red Crescent Societies launched a new five-year food security strategy in Africa focussing on long-term investments to improve food
security programmes in 15 African countries. The new plan will include new technologies, seed banks and soil nutrient management, and the establishment of community-based food security monitoring systems.

The Twenty-Fifth Special Meeting of the Council for Trade and Economic Development (COTED) on the Environment held in Greater Georgetown, Guyana, April 17-18, 2008 focused on critical environmental issues that affect the lives of people of Small Island Developing and Low-Lying Coastal States. It was agreed that the Caribbean Community Environmental and Natural Resource Framework should address adaptation to climate change effects and food security and freshwater resources.

In Australia, a six-year-long drought reduced Australia’s rice crop by 98% affecting local population, prices, and importing countries’ food source.

A conference hosted by the European Water Forum in the European Parliament on 16 April increased the warnings of growing water scarcity concerns, calling for speedy solutions to combat water shortages, which might include higher water prices to deter overuse.

In order to assist countries to adopt a new strategy for addressing food and water security by engaging international action to combat desertification, land degradation and drought, the UN Convention to Combat Desertification Secretariat is convening a high-level policy dialogue to be held in Bonn, Germany on May 27.

Water security will also be affected by earlier melting of glaciers and mountain snow, leaving millions of people in need during the summer when rainfall is lower, warn scientists. The earth’s sub-tropic zones, home to 70% of the world’s population, are the most vulnerable. The areas most at risk include parts of the Middle East, southern Africa, the United States, South America and the Mediterranean.

The fast melting high altitude glaciers in Andean mountains alter eco-systems, affecting the livelihood of people of Peru, Ecuador and Bolivia. The IPCC estimated that rising temperatures could melt most of Latin America’s glaciers by 2022. In some regions, demand for water might exceed supply as soon as 2009. (April 2008) Ref.766

**Food Crisis in Southern Africa and Horn of Africa**

Africa is currently facing an acute food crisis, with more than 6 million people at risk in Southern Africa and at least 12 million in the Horn of Africa. Rains have come too little and too late to remedy a serious drought that has decimated crops and led to widespread dependency on donor supplies. According to the U.N. World Food Programme (WFP), 6.5 million people are vulnerable to food shortages in South Africa. Zimbabwe is particularly hard hit. In addition to wild fruits and roots, households in some parts of Zimbabwe are reportedly already eating locusts. According to the USAID, the total number of people facing food insecurity in Zimbabwe could rise to about 7.5 million, or more than half the population, before next year. Even the region’s breadbasket, South Africa, has been devastated by the recent drought, which has reduced maize crops to their lowest level in more than half a century. The Greater Horn of Africa Food Security Bulletin estimates that 7 million people in Ethiopia, 2 million in Tanzania, 1.2 million in Kenya and 1.2 million in Eritrea are facing hunger. (January 2004) Ref.767

**Food Security Observatory Proposed for Sahel-Saharan Region**

Food security was the main theme of the 10th Summit of the Community of Sahel-Saharan States (CEN-SAD). The Tunisian delegation has submitted a proposal to set up a food security observatory for the Sahel-Saharan States (CEN-SAD) region, to prevent and/or deal with food
crises. The role of the observatory would be to monitor agricultural products’ availability and prices, and investments in agricultural growth, as well as natural resources such as water and soil, and formulate strategies and policies based on food availability and needs. The project should be funded by member states and partners, and the stakeholders should be member states and executive organs of the African Union and sub-regional organizations. (June 2008) Ref. 768

Freshwater

Freshwater Scarcity Issues and Regional Aspects

Two-thirds of the Tibetan plateau glaciers might be gone by 2050 if the current temperatures rise continues, note scientists. Water shortages would affect 2 billion people in China, India, Pakistan, Bangladesh, and Bhutan. (January 2009) Ref. 770

Global warming and melting of Tibetan glaciers might produce 15 million “environmental refugees” in South Asia and conflicts within Punjab and Sindh, warns Simi Kamal, member of the Stockholm-based Global Water Partnership Technical Committee, adding that water distribution is political in nature and needs to be resolved in order to avoid conflict. (December 2008) Ref. 771

Experts reiterated that half the world will face water shortages by 2080, with Asia being the most affected due to its large population, melting of Himalayan glaciers, and low-lying costal areas. Southeastern U.S. states are being advised to diversify their water supplies in expectation of a drier future climate. In Australia’s Murray-Darling Basin, irrigated agriculture could be halved by 2050; and in the Sahel region, an estimated 110 million people might be affected by Niger’s seasonal flooding decrease due to changes in rainfall patterns and human exploitation. (November 2008) Ref. 772

Experts (including Nicholas Stern) attending the Goldman Sachs ‘Top Five Risks’ conference, reiterated the warning that the possible future water shortage would be a bigger threat to mankind this century than the food crises and exhaustion of energy reserves. The Himalayas for instance are the source for all the major rivers of Asia and for almost half the world's population.

In Africa, to shrinkage of mountain glaciers from Mount Kilimanjaro to Uganda’s Rwenzori mountains—which decreased by 50% between 1987 and 2003, drying lakes such as Lake Chad, and falling water levels in Lake Victoria, the atlas adds new cases of disappearing water bodies like Lake Faguibine, as well as the many examples of desertification, unsustainable large-scale irrigation and degraded coastal areas that are further increasing the threat to already scarce water reserves. (June 2008) Ref. 773

World Water Day theme in 2007 was ‘Coping with Water Scarcity’ to highlight limited water resources and the imbalances between availability and demand.’ If today water scarcity affects 700 million people around the world, by 2025, this could rise to more than 3 billion. Since many of the world's rivers and aquifers are shared among countries, conflicts are likely to be exacerbated, unless integrated cross-border water management systems are implemented. Several
reports released on the occasion of World Water Day reveal today’s realities, suggesting policies and future possible developments. The WWF report, World's Top Rivers at Risk, warns that global warming and man-made causes destroy some of the world's largest rivers, threatening ecosystem and people’s livelihood. The report assesses pollution, development, and water management of ten of the world's most important rivers: the Nile, the Danube, the Rio Grande, La Plata, Yangtze, Mekong, Salween, Ganges, Indus, and Murray-Darling. It is calling on policymakers to take notice of the emergency nature of the situation and to set up strategies to reverse damage to freshwater sources. “Conservation of rivers and wetlands must be seen as part and parcel of national security, health and economic success,” stressed Jamie Pittock, WWF Global Freshwater Programme Director. The IPCC report Impacts, Adaptation and Vulnerability, forecasts that “hundreds of millions of Africans and tens of millions of Latin Americans who now have water will be short of it in less than 20 years. By 2050, more than 1 billion people in Asia could face water shortages. By 2080, water shortages could threaten 1.1 billion to 3.2 billion people, depending on the level of greenhouse gases that cars and industry spew into the air.” The report will be released at the beginning of April. As Peru’s glaciers are melting, the country might run out of water. In China, air pollution is causing reduced rainfall, increasing drought in northern China. [See also World Water Forum 2006, Unless Water Management Improves, Conflicts over Water Are Inevitable, and other previous environmental security reports on the water issue.] (March 2007) Ref. 774

Project to Address the Aral Sea Disaster
The Government of Uzbekistan and the World Bank have instituted a Drainage, Irrigation and Wetlands Improvement Project, described as “the first meaningful intervention in the Aral Sea Basin to break a vicious cycle of high water applications, water logging and secondary soil salinisation”, said Masood Ahmad, head of the World Bank team designing the project. According to a World Bank statement, the agreement hopes to improve the local economy, and the water quality of the Amu Darya River by safe disposal of drainage effluent and enhancing the quality of wetlands in the Amu Darya delta. The team leader added that the project would begin to address the problem by substantially improving drainage conditions and significantly improving water use efficiency in the irrigation sector. (February 2005) Ref.775

Future Sea-level Rise will make Freshwater Brackish
The southern Pacific region experienced “king tides” on February 28, 2006, as a result of the 26-year cycle of essentially perfect gravitational alignments of the Sun, Moon and Earth. The island of Funafuti, Tuvalu (max. elevation = 3.7 meters) had tide swells of 3.4 meters above normal in calm weather. While this rise is only minimally attributable to global warming sea-level rise at this stage, it does point to impacts to be expected well before actual inundation of low-lying regions might result from that phenomenon. While only three of the lowest situated homes experienced yard flooding, Dr. Mark Hayes of the University of Queensland observed water bubbling up to emerge on top of the soil. This would have occurred from rapid, significant intrusion of seawater below the lens of brackish and freshwater held in pores and cavities of the island’s rocky structure and soil. Such intrusion will have contaminated some of the freshwater upon which residents depend for direct use and for agriculture. In low rainfall regions, such damage will not self-repair quickly. It is likely that well before physical inundation from general sea-level rise forces residents to flee, they will have to abandon the island owing to unavailability of potable water and water for even salt-tolerant crops and trees. Funafuti is one extreme case,
but represents a snapshot of the future for all low-lying islands and littoral zones. [See also Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels in January 2006, First People Displaced Due to Rising Sea Levels in December 2005 and other related items in previous environmental scanning reports.] (March 2006) Ref. 776

Unless Water Management Improves, Conflicts over Water Are Inevitable

The 16th annual conference on water took place in Stockholm, during World Water Week, August 20-26. Reports released during this week warned of possible consequences of future water scarcity, such as increased cost of water, civil unrest, mass migration, and economic collapse. There was consensus that poor management of water resources and soaring water usage are the main causes of water scarcity increasing worldwide faster than expected; and, unless there are drastic policy changes around the world, the grim statistics will only worsen, mostly in the densely populated and poor regions of China, Mexico, and India. A report by The World Wildlife Federation (WWF), Rich countries, poor water, warns that wealthy nations are threatened by a water crisis similarly to the drought-plagued poor countries, due to climate change, drought, loss of natural wetlands, and over-consumption by industry, agriculture and big cities. The report suggests seven ways to address the problem. The International Water Management Institute notes that while over the past 100 years water usage had increased six-fold, it is expected to double again by 2050.

The World Bank estimates that 20-40% of water sector finances are lost to corruption. Water experts and businesses formed the Water Integrity Network (WIN) to combat corruption in the water sector. WIN is open to all. Transparency International and water corporations are the initial principal members. WIN seeks reforms to improve regulations and transparency, as well as increase public awareness.

Asia’s Coming Water Wars, a comprehensive analysis by The Power and Interest News Report, warns of water problems increasing conflicts in some Asian regions already beleaguered by long-standing historical animosities and internal instabilities. The most vulnerable regions for water-related conflicts are Central Asia, South Asia and the Mekong sub-region in Southeast Asia. Considering these regions’ rapid development, growing populations and instabilities, water-related tensions might have wider regional and global significance.

Business in the world of water—WBCSD Water Scenarios to 2025 presents the critical future water situation in three “H2O” scenarios: “H” (Hydro)—urbanization, technical and efficiency-focused, with serious water allocation problems; “2” (Rivers) is a world of water security based on compromise; “O” (Ocean) describes a functional society based on interconnectivity and cooperation of all systems’ actors. (August 2006) Ref. 777

Prospects for Conflict over Water Rise in Several Regions

Rapidly melting glaciers in the Himalayas could cause vast flooding followed by long-term, severe water shortages in the region, according to World Wildlife Fund’s report, An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China. Water from the Himalayas feeds into seven great Asian rivers, ensuring the water supply of hundreds of millions of people. Flooding and then water shortage will inevitably cause mass migration. The reduced capacity of the Jordan River and the ecological disaster caused by its over-exploitation triggered discussions between Israel and Jordan. However, no agreement has been reached. The problems are worsened by Jordan’s plan to construct a new dam on the Yarmuk River, the largest tributary of the Jordan. Friends of the Earth Middle East (FoEME) tries to
mitigate the situation by organizing discussions and joint activities; it also launched the idea of placing the Jordan river on UNESCO’s World Heritage List due to its tremendous ecological and cultural significance.

The risk of conflict over water for countries along the river Nile or its tributaries increases as the 1929 treaty is being increasingly contested. The treaty allows Egypt to use Nile water only for irrigation or power generation. Meantime, under the umbrella of the Nile Basin Initiative launched by the Nile riparian states in 1999, Italy is funding a new project to improve water management among the ten Nile Basin countries. Implemented with assistance from FAO, the project will integrate technical water resource and water use data with demographic, socio-economic and environmental information to examine how specific policies and projected water use patterns will affect water resources in the region. (March 2005) Ref. 778

Israel-Lebanon: Water Project Launched Despite Mounting Tension
The water-pumping project at the southern Wazzani River, launched by Lebanon in October despite Israel’s disagreement, could lead to an escalation of hostilities in the region. There is no formal agreement on sharing water in the region. At a recent meeting at the AAAS, the Israeli Director of Friends of the Earth organization stated the stringent necessity for enforced treaties that clearly stipulate quotas and rules for shared watersheds in the region, to avoid future conflicts. (November 2002) Ref.: 779

World Water Week Warns of Wars over Water
Scientists at the World Water Week conference held in Stockholm, August 16–20, 2004, have stated that the risk of wars being fought over water is rising because of explosive global population growth and widespread complacency. A report prepared by the International Water Management Institute extrapolated present water consumption to a point of conflict over water. The conference called for increased water infrastructure investments. Water tables are falling on all continents. About 40% of humanity lives in the 260 major international water basins shared by more than two countries. According to the recently released joint WHO-UNICEF report, more than 1 billion people drink unsafe water and over 2.6 billion (40% of the world's population) have no access to basic sanitation. (August 2004) Ref. 780

Tensions Among Ten Nations May Change Nile Water Usage Treaty
A committee of representatives from ten African countries bordering the Nile River met in Uganda on 8 March 2004 to decide how they can best share the river. This meeting was a follow-up to one held in Ethiopia last December, during which the committee was set up by the Nile Basin Initiative (NBI). The NBI, based in Entebbe, Uganda, is an intergovernmental organization formed in 1999 to help the countries cooperate in the management and use of the Nile River. Most of these countries have called for the abolishment of the 1929 treaty that prohibits any country from using the Nile in a way that would reduce the water supply of Egypt or Sudan. This effectively prohibits the other countries from using the waters in large-scale projects such as irrigation and hydroelectric power production. As a result, tensions in the region are increasing. The treaty is seen as preventing development. [See also African Water Issues in the Millennium Project, April 2003 Environmental Security monthly report.] (March 2004) Ref.781

In central Kenya, Kikuyu and Maasai tribal fighters clashed over scarce water supplies, killing at least 14 people in two days. Thousands fled the fighting site, some were injured, and dozens of
houses were burned. Although officials stopped the fight, tensions remained high.

**India and Pakistan** talks over the Baglihar hydropower dam on the Chenab River failed. Pakistan is objecting to the construction of the dam that would affect the flow of the Chenab into its territory, and contravenes a 1960 water-sharing treaty negotiated by the World Bank. The long-running dispute threatens to cause another setback to an already fragile peace process. (January 2005) Ref. 782

At a recent regional meeting, **Bangladesh and Nepal** continued to object to **India**’s plans to divert water from 37 rivers to its drought-prone areas by building reservoirs, dams, and canals. Bangladesh is claiming the plan would reduce its water levels, threaten the livelihoods of millions of people, turn parts of Bangladesh into desert, and damage the impoverished country's fishing and farming sectors. Nepal is also claiming the project would cause unseasonable flooding in Nepal, where most of the rivers flowing through India and Bangladesh originate. As with the simmering Indian-Pakistani water situation, this water diversion is a potential trigger for armed conflict. Although India’s new government has seemed willing to discuss the issue, the fact remains that India has a long-term water scarcity problem that it must somehow address. (August 2004) Ref. 783

**Indian Water Diversion from 37 Himalayan rivers to be completed by 2016 affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water.**

India has been planning to divert water from 37 Himalayan rivers to drier areas of the country. A report on this irrigation scheme is due by 2006, with construction to commence shortly thereafter and be completed by 2016. However, diversion of these rivers affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water. Flooding during the monsoon season is likely to increase as a result of this diversion. Salinity would affect agricultural lands. The mangrove forests of the Bangladeshi deltas, which are a World Heritage site, would suffer from the lack of fresh water influx. Bangladesh is protesting through diplomatic channels. About 40% of humanity lives in the 260 major international water basins shared by two or more countries; hence, one can expect an increasing need for bi- and multi-lateral treaties to prevent conflict. (August-September 2003) Ref. 784

**Asia’s Water Security in Jeopardy**

*The Fall of Water* report assesses the situation of Asia’s mountain areas, including the Himalayas. It warns that rapid increase in infrastructure, overgrazing, and deforestation, are accelerating threats from highland glaciers shrinking, raising concerns related to the region’s future water supplies, flooding, and drought. The report notes that presently about 50% of Asia’s mountain region is affected by infrastructure development, which by 2030 could rise to over 70% if current practices continue unrestricted. Similarly, highland glaciers are shrinking by 7% annually, which means that by 2050, about 64% of China’s glaciers would have vanished. The report argues that unsustainable local development and climate change accelerated by fossil fuel burning are likely to aggravate the problems. It points out that without fast implementation of sound environmental management policies for sustainable development, water security of about half the world’s population could be in serious jeopardy. The outcomes are the results of collaborative work of UNEP, IUCN, Chinese Academy of Sciences, International Centre for Integrated Mountain Development (ICIMOD), and the Netherlands Environmental Assessment Agency. The report was released in preamble to the 2005 World Summit of mid-September. (September 2005) Ref. 785
China River Basin Issues
Promoting Sustainable River Basin Governance—Crafting Japan-U.S. Water Partnerships in China, a publication by the Woodrow Wilson Center's China Environment Forum and Japan Institute of Developing Economies, is the result of cooperation between Chinese, U.S., and Japanese water experts on improving Chinese river basin management. The report explores areas of collaboration between the three countries on three central issues: (1) river basin management institutions, (2) financing, and (3) public participation.
Meanwhile, the lower Min River, which is one of the Yangtze’s major tributaries, is essentially dry as a result of dams built in its upper section; consequently, the downstream communities do not get water for domestic use and irrigation for millions of hectares of farmland, causing food and water shortage in a heavily populated area. (April 2005) Ref. 786

African Water Issues
IRIN (Integrated Regional Information Network), the UN Humanitarian news agency, issued a Web special on African water issues. It includes case stories on the Nile, regional cooperation between South Africa and Swaziland, and the saving of Lake Chad. (April 2003) Ref.: 787

International agreements are needed for 158 International Freshwater Basins
Several water security-related reports were released during the largest gathering of water scientists and policy experts at the Third World Water Forum held March 16-23 in Kyoto, Osaka and Shiga, Japan. The “Water for People, Water for Life” report discusses looming water wars and the “Atlas of International Freshwater Agreements” surveyed water-sharing contracts among nations and found that of 263 international freshwater basins, 158 lack cooperative agreements. UNESCO announced the creation of a “Water Cooperation Facility” to help countries prevent and resolve freshwater disputes.
Mr. Toepfer of UNEP suggested that international organizations “… should perhaps act as the water equivalent of marriage guidance counselors, amicably resolving differences between countries and communities who may be straying apart, or act as go-between for those who are flirting with cooperation but are too coy, too unsure, maybe even too distrustful about how to proceed. So we must hone our skills and develop our capabilities in what will be the increasingly important field of hydro-diplomacy.” (March 2003) Ref.: 788

Global Plan to Address Freshwater Supplies Negotiated
In preparation for the 5th World Water Forum to be held in March 2009 in Istanbul, senior officials from more than 60 countries met in Rome, January 21-23, to negotiate a global plan of action for addressing issues of freshwater resources and improving water governance. Industrial and agricultural use, growing population, pollution of ground and underground reservoirs, and effects of climate change all reduce the amount of clean water available and threaten water security. The Rome meeting is expected to negotiate a Ministerial Statement to be adopted by the Ministerial Conference at the World Water Forum. [The outcomes of the meeting were not available at the time of this writing.] Meanwhile, addressing the meeting “Managing our Future Water Needs” held in Davos, UN Secretary-General Ban Ki-moon underlined, “The problem is that we have no coordinated global management authority in the UN system or the world at large. There is no overall responsibility, accountability or vision for how to address the related problems of climate change, agricultural stress and water technology.” [See also Unless Water
Management Improves, Conflicts over Water Are Inevitable in August 2006 and other related items in previous environmental security reports.] (January 2009) Ref. 789

**Water Poverty Index**
The newly developed Water Poverty Index is designed to help policy-makers to identify where problems exist and the appropriate measures to deal with their causes. The index, compound of five vectors - resource, access, use, capacity and environment - highlights that it is not the quantity of available water resources that counts the most, but the effectiveness of the use of those resources. (December 2002) Ref.: 790

**Tools for Improving Water, Sanitation and Hygiene**
A Review of Decision-Making Support Tools in the Water, Sanitation, and Hygiene Sector, a study directed by Peter H. Gleick at the Pacific Institute and by Geoffrey D. Dabelko at the Wilson Center's Environmental Change and Security Program, evaluates 120 existing resources in the sector, analyses the world’s situation on access to water and sanitation, and assesses existing technologies and methodologies. The report recommends development of a set of tools to help decision-makers with infrastructure development, available technologies, and possible approaches. The tools would also outline specific needs of geographic locations, evaluate community particularities, and use case studies to demonstrate available technologies. (May 2008) Ref.791

**Improved Database for Stormwater Best Management Practices**
Improvements in the International Stormwater BMP Database (www.bmpdatabase.org) were recently announced. They will ease BMP searches, data collection and uploading, and access to BMP performance analyses. The changes include more data, new data analysis results, easier Web site navigation, and simplified data entry. (May 2008) Ref.792

**EC Proposal for Water Pricing**
The European Commission released a green paper proposing a water framework directive to deal with possible future water scarcity and assure sustainable water use in Europe. Feedback on specific proposals for pricing water on the “user pays” principle is expected from both the European Council and the Parliament. The EC warns that water shortage and drought might become the norm in Europe by 2070. (July 2007) Ref.793

**Consultative Group on International Agricultural Research (CGIAR) initiates Program to Fight Water Shortages**
The Consultative Group on International Agricultural Research (CGIAR) plans to launch a $100 million five-year initiative in 15 developing countries to fight water shortages. Together with the International Food Policy Research Institute (IFPRI), they have produced the Global Water Outlook to 2025: Averting an Impending Crisis, which projects that by 2025 water scarcity will cause annual global losses of 350 million metric tons of food production - more than the annual grain harvest of the US. (November 2002) Ref.794

**Could large-scale ocean zoning prevent conflicts?**
Increasing numbers of environmental lawyers and environmentalists believe that future conflicts could be prevented by large-scale ocean zoning for oil, fishing and wind farms, as well as that
there is an immediate need for regulations to protect the oceans' natural resources. “We’re now able to do on the open ocean what we once did on our western frontier—eradicate the wildlife, extract the minerals and alter or pollute the habitat,” says David Helvarg, president of the Blue Frontier Campaign. Many variations of coastal zoning have been established around the world, which may one day lead to new large-scale ocean zoning within a more comprehensive integrated planning mechanism for local, regional and international standards and regulations for ‘pro-active rather than re-active’ ocean management. (March 2005) Ref. 795

**Singapore’s New Institute of Water Policy**
Singapore established an Institute of Water Policy with a US$5.5 million 5-year budget to research Asia’s water problems, address water security, and consult to governments and international organizations. (June 2008) Ref.796

**European Water Pollutants List Delayed One Year**
The European Water Pollutants List will be published at the end of the year (one year delay) together with the package of new water quality objectives and emission standards intended to implement the law. The delay is necessary to determine whether the substances under review stay listed as priority substances -- remain in circulation under certain restrictions -- or will be declared priority hazardous substances -- to be phased out entirely within 20 years. (January 2003) Ref.: 797

**Decade Water for Life Launched**
The International Decade for Action “Water for Life” was officially launched on World Water Day, March 22, 2005. This is intended to focus world attention on improving policies and strategies to achieve the international commitments and targets concerning water-related issues by 2015. The actual debates and policy recommendation issuance are expected to occur in April 2005 at the 13th session of the UN Commission on Sustainable Development. (March 2005) Ref. 798

United Nations International Decade "Water for Life", 2005-2015, will increase attention to the implementation of water projects around the world. The 1.2 billion people without access to safe drinking water, and the 2.4 billion people without adequate sanitation pose a major long-range environmental security threat. The UN International Decade for Action, "Water for Life", 2005-2015 will increase attention to the implementation of water projects around the world and calls on the UN Secretary-General and others to increase collaboration to achieve the UN Millennium Development Goal #2 on Water. (February 2004) Ref.799

**International Year of Freshwater**
Designation of 2003 as the International Year of Freshwater has triggered many events around the world to increase more responsible water use and conservation. The World Water Development Report was launched at the Third World Water Forum (March) highlighted by the World Water Day, March 22, 2003. The report is the first UN system-wide effort to monitor progress in all areas of water from health to ecosystem and governance. “Future of Water” was the theme of the 21st Century Talks held at UNESCO Headquarters on January 28, 2003. (January 2003) Ref. 800
Reports on Water-related Issues
The Environment, Development, and Sustainable Peace Initiative, a joint project of Adelphi Research, the WWICS Environmental Change and Security Project, and the National University of Costa Rica, has published in March 2005 two papers analyzing the role of water for security: *Regional Water Cooperation as Confidence Building: Water Management as a Strategy for Peace*, by Aaron T. Wolf. The report analyzes the shift of the “environmental security” concept from a presumed causal relationship between environmental stress and violent conflict to a more intricate framework of “human security” that considers a complex set of relationships between environment and society. Water has been identified as the most critical factor in many areas—from political to economic, social, and environmental. While looking at ‘Indicators of Tension,’ the paper also suggests some opportunities and types of policy recommendations to mitigate possible water-related disputes: the new technologies for water negotiation and management (including modeling and monitoring tools); watershed commissions developed for those basins that do not have them, and strengthened for those that do; improved water-related funding assistance; and better involvement and focus of civil society, private industry and research organizations.

*Environmental Conflicts and Regional Cooperation in the Lempa River Basin: The Role of Central America’s Plan Trifínio*, by Alexander López. Assessing current environmental trends in the Central American context, the report focuses on the region’s international river basins and uses the Lempa example to analyze areas of conflict and cooperation; factors that could reduce conflict potential; and the effectiveness of the Trifínio Plan and its role in facilitating post-conflict dialogue and confidence building among the three signatory countries: Honduras, Guatemala, and El Salvador.

The U.S. National Academies have created the Water Information Center, a new Web site that provides free access to more than 100 Academies reports on water-related issues [http://water.nationalacademies.org/](http://water.nationalacademies.org/) (March 2005)

*Water, Conflict, and Cooperation*, a “policy brief” featured in the latest Woodrow Wilson Center Environmental Change and Security Project Report (10), argues that water scarcity issues are both a threat and an opportunity for the UN system. Effective UN water policies and management could enhance cooperation and reduce the potential for conflict. The authors suggest the creation of a "one-stop shop" – pooling the many UN organizations that work on water issues – so that nations and organizations would get the best synergies of personnel, technologies, and advice to improve their water improvement systems.

*Making Water a Part of Economic Development: The Economic Benefits of Improved Water Management and Services*, by the Stockholm International Water Institute and WHO, argues that efficient water management for human security could accelerate economic growth, sustainable development, and improving health. The report demonstrates that economic benefits far outweigh the costs and suggests three major investment priorities: access to safe water and basic sanitation; protection of the integrity of aquatic and water-related terrestrial ecosystems; and water-resource management. The report was released at the UN headquarters in conjunction with the 13th Meeting of the Commission on Sustainable Development (CSD). (April 2005) Ref. 801
Water Forums

Forums Discuss Water-Related Security Issues


The International Conference on Water Resources and Arid Environment and the First Arab Water Forum took place in Riyadh, Saudi Arabia, November 16-19, 2008 and addressed challenges related to water resources in the area and strategies to address them, including new technologies and Arab water policies for development and water crisis management. In his opening address, Prince Khalid bin Sultan bin Abdulaziz warned of possible terrorism targeting water resources and called for a water summit similar to the world economic summits. [See also Unless Water Management Improves, Conflicts over Water Are Inevitable in August 2006 and other related items in previous environmental security reports.] (November 2008) Ref. 802

UNEP’s Governing Council Focuses on Water and Sanitation

A recent international gathering of environment ministers focused on the need to boost water and sanitation services for over two billion people in human settlements. The meeting also showcased water saving and water supply technologies that can play a key role in meeting the Millennium Development Goals and the World Summit on Sustainable Development’s Plan of Implementation. These call for governments to halve, by 2015, the proportion of people without access to safe and sufficient water and basic sanitation supplies. Ministers and officials from over 150 nations also discussed the need to boost the science base of UNEP in areas including environment and conflict and environment and poverty. (April 2004) Ref.803

4th World Water Forum

“Lack of water or its poor quality, last year [2005], caused 10 times more deaths than all the wars waged on the planet together,” noted Loïc Fauchon, President of the World Water Council, in addressing the 4th World Water Forum held March 16-22 in Mexico City. About 20,000 participants from 141 countries participated. There were over 200 sessions and 1,600 local actions were presented. The dominating discussions were on: universal access to clean water—without border constraints; recognition of water as a fundamental human right and key to development; access to water-related technologies; and improved water management and capacity building. At the Ministerial Conference concluding the Forum, high-level officials adopted the Ministerial Declaration, calling for intensified national and international action on water and sanitation issues by including water and sanitation as priorities in national processes, and support for integrated water resources management.

Some reports produced in conjunction with the WWF:
The second edition of the World Water Development Report, Water: A Shared Responsibility, was launched on World Water Day, which’s theme this year was “Water and Culture,” stressing the role of local practices for good water management. The comprehensive triennial assessment of freshwater resources addresses the consequences of climate change on water challenges,
health and development implications of water scarcity and, emphasizing that water is shared responsibility, the report recommends improved water governance at all levels, including institutional capacity, legal frameworks, and resource distribution.

Other studies launched around the Forum also underline implications of poor fresh water management ranging from access and administration, to pollution and overexploitation. *Challenges to International Waters: Regional Assessments in a Global Perspective*, report by UNEP, addresses mainly water shortages, overfishing, and pollution, and their implications for health, food security, and development, making several recommendations to reverse the damage and declines. It warns that unless improved water management practices, many of the problems are expected to “increase in severity by 2020”.

Access to clean water and sanitation might be worsened by high rate of urbanization, mainly in small urban centers, warns *Meeting the development goals in small urban centres?* report by UN-HABITAT. Considering that by 2015, more than half of world population will live in urban areas, and the urban population of Asia, Africa and Latin America is expected to reach 4 billion within the next three decades, increased efforts are necessary to develop socially and environmentally sustainable cities.

*Changes in Surface Water Supply Across Africa with Predicted Climate Change*, paper by Africa Earth Observatory Network, University of Cape Town, is a detailed assessment of the consequences of climate change on the water situation in Africa. It warns that without immediate implementation of adequate water management systems, by the end of the century a quarter of the continent would suffer of lack of surface water, and the access to clean water will continue to worsen with half of the African population expected to live in urban areas by 2030. Presently, it is estimated that out the approximately 800 million Africans, some 300 million lack access to safe drinking water, and 313 million do not have access to basic sanitation. (March 2006) Ref. 804

**UN Conference ‘Water for Food and Ecosystems’**

The recent UN conference ‘Water for Food and Ecosystems,’ attended by 26 ministers and more than 600 delegates from 140 countries, emphasized the need for “a true valuation of water” and called for better strategies for balancing water use between agriculture and environment. It called for better management of water, taking into account socio-economic and environmental concerns, basic human rights, and cultural factors, and adopted a list of actions to improve the efficient use of water, highlighting the importance of public/private partnerships in achieving the goals. Water policy and strategy issues were also discussed at the 23rd session of the UNEP Governing Council/Global Ministerial Environment Forum held 21-25 February 2005, at Nairobi, Kenya. (February 2005) Ref. 805

**International Freshwater Forum calls for better watersheds management**

In his address to the International Freshwater Forum held at the end of August 2003 in Dushanbe, Tajikistan, UN Secretary-General, Kofi Annan, emphasized that delay in providing safe water results in great risks and called for better regional watersheds management. The same idea was reaffirmed in the message of OSCE Secretary General, Jan Kubis, who also indicated that the OSCE is directly engaged in a number of projects that aim at promoting dialogue and cooperation on sustainable water management “to enhancing early warning and conflict prevention mechanisms and strengthen processes of confidence-building and co-operation throughout the OSCE area.” The Government of Tajikistan was hosting the forum under the broader theme of...
“Water, Environment and Security”.

At a side-event, OSCE, the United Nations Development Programme (UNDP) and UNEP presented the joint OSCE/UNDP/UNEP Initiative on Environment and Security (ENVSEC). Phase one of the Initiative identified the key problems affecting the environment and human health and posing an immediate security risk in the region; "the next step will be to map out and implement common environmental priorities and opportunities for strengthening co-operation," said Frits Schlingemann, Director and Regional Representative, UNEP.

Note: The “World Bank's Board of Directors has recently endorsed a new Water Resources Strategy as well as a new Infrastructure Action Plan in response to strong client-country demand for infrastructure.” (Ian Johnson, Vice President of Environmentally and Socially Sustainable Development; and Nemat Talaat Shafik, Vice President) The United Nations University (UNU) and Tokyo University of Agriculture and Technology (TUAT) will host in October an international symposium on “Public Participation and Governance in Water Resources Management.” (August-September 2003) Ref.: 806

Water, Sanitation, Human Settlements next focus for UN Commission on Sustainable Development

The UN Commission on Sustainable Development (CSD) will focus on sanitation and human settlements during 2004 and 2005 and how to halve the proportion of people without access to safe drinking water and basic sanitation by 2015. (May 2003) Ref.: 807

Water Forum Held in Egypt

The UN Economic and Social Commission for Western Asia (ESCWA) held a workshop on mapping methodology, the first of a series of activities to improve water management in Western Asia. The workshop, hosted in cooperation with Egyptian government ministries and UNESCO, was a part of establishing the Arab Integrated Water Resources Management Network (AWARENET). The network links training and research institutes and encourages collaboration on improving and disseminating knowledge on concepts of integrated water resources management in the ESCWA region. Participants learned mapping methodology and developed an AWARENET plan of action that details activities, timetable, management structure, and a fund raising strategy. (May 2003) Ref.: 808

Greece Hosted Transboundary Water Issues Conference


**Population Trends and Environmental Impact**


U.S. National Report on Population and the Environment by the Center for Environment and Population (CEP) is the first comprehensive assessment of the impact of U.S. national and regional population trends on the environment. The report addresses the main “America’s
Population-Environment Challenges”: land use; water; forests; biodiversity; fisheries and aquatic resources; agriculture; energy; climate change; and solid and toxic waste. It highlights that from 1995 to 2005, the U.S. population increased by 10.6% (29 million people)—the highest rate of industrialized countries—and raises concerns over environmental consequences, since the U.S. already has the largest per-capita environmental impact in the world. It warns that in the future the situation might become more critical due to uneven distribution of the population, climate change, rising sea levels, and pollution. (September 2006) Ref. 811

World Population in 2025
Mapping Future Population Growth by the Earth Institute at Columbia University is mapping projected population change for the year 2025. It notes that most population growth will continue to be in already densely populated developing countries like India and China, and coastal population will increase by 35%, to 2.75 billion people living within 60 miles of the ocean; therefore, there will be increasing vulnerability to disasters resulting from climate-change and rising sea level. (September 2006) Ref. 812

Demographics and Destiny: Trends We Need to Understand in the 21st Century
Demographics and Destiny: Trends We Need to Understand in the 21st Century by Endy Zemenides, argues that demographics is one of the important factors framing the 21st century security agenda, and points out 10 key demographic trends: 1) aging of the developed world; 2) youth bulges in the Islamic world; 3) long term population decline in Russia; 4) rise of urbanization/megacities in the developing world; 5) negative birth rates in Europe; 6) developed world’s reliance on immigration; 7) Islamization of Europe; 8) steep increase in the number of Chinese and Russians with lung cancer, heart disease and other pollution-related health problems; 9) population growth around limited renewable resources; and 10) high fertility rates in the developing world. Demographics, the article argues, can change the way we fight war and add reasons for fighting wars. The author concludes that the U.S. must recognize the looming demographic issue and develop a comprehensive demographic strategic plan. (October 2007) Ref.813

Food Security Summit Usefulness Debatable
About 5,100 people from 181 countries, including 43 heads of state or government and 100 ministers, participated in the June3-5 FAO conference on World Food Security. The governments adopted the “Comprehensive Framework for Action” and pledged $13 billion during the conference. FAO Director-General Jacques Diouf estimates that $30 billion a year will be needed to re-launch agriculture and avert future threats of conflicts over food, and UN Secretary General Ban Ki-moon reiterated that food production should increase by 50% by 2030 to overcome the long-range food crisis. The next forums to address the food crises are the G8 summit in Japan in July, the UN/FAO Food Security Committee meeting in October, and the FAO Conference in November. (June 2008) Ref.814

FAO Launched New Crisis Management Centre
In collaboration with the World Organisation for Animal Health, the UN Food and Agriculture Organization launched a new Crisis Management Centre to fight avian influenza outbreaks and other major animal health or food health-related emergencies. The center continuously monitors disease information around the globe and is able to respond in less then 48 hours, when a suspected outbreak is reported. (October 2006) Ref. 815
OSCE Environmental Security Conference Focuses on Land and Water
On January 22-23, 2007 the Organization for Security and Co-operation in Europe (OSCE) held a conference with the theme: “Key challenges to ensure environmental security and sustainable development in the OSCE area: Land degradation, soil contamination and water management.” The speakers were a diverse mix of mostly European political, governmental, environmental, and security experts, who further developed OSCE’s role in environmental security for the region. Germany offered to take the leadership in environmental cleaning up of closed military facilities in the region. OSCE is composed of 56 countries. "The most significant issue presented was the critical rate of loss of arable lands in the arid regions of Eastern Europe. Experts from these countries requested urgent assistance from the OSCE to stem this impending crisis," said Dr. King of the U.S. Army Command and General Staff College, who led the first panel. (January 2007) Ref. 816

Human Ecological Footprint Increasing Each Year
The 2007 ‘Ecological Debt Day’ was on October 6, three days earlier than in 2006, noted the New Economics Foundation. ‘Ecological Debt Day’ marks the day of the year when human consumption begins surpassing the Earth's ability to sustain it. The point has been reached earlier every year since the 1980s, when the world began to live beyond its means. The results of a study using the ecological footprint index also revealed that the world is developing very unsustainably. The study is looking at how the lifestyles and ecological footprints of 93 nations have changed in the last 30 years. It is the first study of this kind and was conducted by an international team of the Global Footprint Network. (October 2007) Ref.817

Living Planet Report 2006
Living Planet Report 2006, by the WWF and the Global Footprint Network, reveals that humanity's impact on the planet has more than tripled since 1961 and Earth's resources are being used faster than they can be replaced by nature, and it warns that, if present trends continue, by 2050 humanity will demand twice as much as the planet can supply. The report breaks down the ecological footprint into components, such as CO2, food production needs, infrastructure requirements, etc. The countries with the highest ecological footprint are: the United Arab Emirates, U.S., Finland, Canada, Kuwait, Australia, Estonia, Sweden, New Zealand, Norway and Denmark. (October 2006) Ref. 818

Global Risk 2007, the World Economic Forum
Global Risks 2007; A Global Risk Network Report by the World Economic Forum (WEF) explores three risk scenarios: Pandemic and Its Discontents; Out of the Global Warming Frying Pan (and Into the Fiscal Fire), and Oil Shock and Its Consequences. It also addresses policy issues related to mitigation and risk prioritization, the risk of water shortages, tropical storms and inland flooding, international terrorism and civil war. The report warns that climate change could cause up to $250 billion loss over the next 10 years, and a sharp increase in oil prices could cause up to $1 trillion of economic losses and trigger a global recession. (January 2007) Ref. 819

Worldwatch Institute’s State of the World 2007: Our Urban Future warns of possible perils from urbanization, if policies, technologies, and behaviors are not changed. The report assesses social
and economic impacts of rapid urbanization, and suggests policies. (50% of the world is expected to be urban within a year.) The chapter Reducing Natural Disaster Risk in Cities notes that of the 33 cities projected to have at least 8 million residents by 2015, at least 21 are coastal cities that will be affected by possible sea-level rise due to climate change. (January 2007) Ref. 820

**GEO Year Book 2007**
UNEP fourth annual report, *GEO Year Book 2007*, was released at the opening of the Global Ministerial Environment Forum in Nairobi [see item Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance]. The report offers a comprehensive overview of global and regional developments over the past year; focuses on implications of globalization on the environment (linkages among ecosystem health, human well-being, and economic development and assesses how policy decisions respond to global change); analyses the environmental implications of nanotechnology; and features several key indicators related to the environment. (February 2007) Ref. 821

**Dossier about Drylands and Desertification Launched by Scidev.Net**
With the occasion of this year’s World Environment Day, June 5, which had the theme Deserts and Desertification, SciDev.Net launched an online dossier resource addressing science and policy issues relating to drylands and desertification. The dossier will be continuously updated with news, features and opinion articles addressing different models, uncertainties, and possible implications of drylands and desertification phenomena, including policy briefs and case studies, and progress reports on the UN Desertification Convention. It is a valuable service for those wishing to keep abreast of dryland issues. SciDev.Net's desert science dossier has been produced with the support of the Consultative Group on International Agricultural Research (CGIAR). About 2 billion people live in the world’s drylands and 250 million people already left their homes because of unproductive soils. [See also International Year of Deserts and Desertification—2006 in January 2006, and Desertification Synthesis (MA report 3) in June 2005 environmental security monthly reports.] (June 2006) Ref. 822

**Asia’s Progress Jeopardized by Environmental Degradation**
*The Millennium Development Goals: Progress in Asia and the Pacific 2007* report by the Asian Development Bank and UNDP hails progress in Asia, showing that the continent might reach the UN Millennium Development Goals for poverty, gender parity, and primary education coverage before the 2015 plan. However, the report warns that this might be jeopardized by environmental degradation (including deforestation and land degradation), poor water management (including flooding), rising pollution in urban areas, and CO2 emission contributing to climate change. (October 2007) Ref. 823

**Grain Harvest Shortfalls may drive conflicts in areas already unstable**
The Earth Policy Institute reports that the global 2003 harvest will fall short of consumption by 93 million tons. This will continue a decline in world grain stocks experienced over the last several years. Elevated temperatures and aquifer depletions are the major drivers of this production decline. The immediate implication is that if such environmental conditions continue, the world will soon be unable to feed itself.
Note: The FAO food outlook preview released this month also reveals a sharp decline in prospects for world cereal output since June, which translates to a much greater global cereal
carryover draw down than expected, and a much tighter global supply-and-demand situation. (August-September 2003) Ref.824

**Sustainable Development and Conflict**
The UN Commission on Sustainable Development’s Twelfth Session (CSD-12) was held in New York from 14 to 30 April, 2004. This meeting was the first substantive review of progress on targets set by world leaders at the 2002 World Summit on Sustainable Development in Johannesburg, which include many of the eight UN Millennium Development Goals (MDGs). CSD-12 discussions centered on halving by 2015 the number of people without access to safe drinking water and basic sanitation, and significantly improving the lives of at least 100 million slum dwellers by 2020. A number of the thematic issues reviewed included the intersection of conflict and natural disaster subjects with environmental and natural resource topics. (May 2004) Ref.825

*Biodiversity for Food Security was the theme of 2004 World Food Day*
The theme of this year's World Food Day (October 16th), *Biodiversity for Food Security*, emphasizes the importance and linkage between biodiversity and food, and ultimately human security. The connection between food scarcity, migration, and conflict is increasingly recognized by international organizations, which are focusing more attention on ways to address this complex environmental security issue. (June 2004) Ref. 826

**Earth’s Biodiversity Decline Increasing**
The recently released 2006 IUCN Red List of Threatened Species by The World Conservation Union reveals that Earth’s biodiversity continues to decline. According to the latest assessments, globally, the number of known threatened species has reached 16,119. New species on the list include the polar bear, ocean sharks, freshwater fish and Mediterranean flowers. [See also International Biodiversity Meetings Make Decisions in March 2006, New Protected Ecological Sites in July 2005, and other related items in previous environmental security reports.] Ref. 827

**HEALTH**

**Climate Change Impact on Human Health**
*Climate Change Futures: Health, Ecological and Economic Dimensions* (CCF), a three-year study by the Climate Change Futures Project at Harvard Medical School's Centre for Health and the Global Environment, is a comprehensive analysis of trends and implications of global warming in several areas: economy (financial, and impact on developing nations), environment (including exacerbating freaky weather); health (spreading and intensifying diseases); and two potential scenarios to outline possible impacts of climate change. The novelty of this study is the analysis of the direct impact of climate change on human health in addition to environmental and economic impacts that are the focus of most other studies. The report concludes that global warming threatens humans and ecosystems alike, particularly if the frequency of extreme weather events increases. It also offers some recommendations of policies and measures for reducing greenhouse gas emissions, and improving the strategies of adaptation and mitigation of climate change effects. (November 2005) Ref. 829

**UNEP Report Warns of Increasing Changes in Infectious Disease Patterns due to**
Environmental Encroachments
The United Nations Environmental Programme (UNEP)'s Global Environment Outlook Year Book for 2004/2005 warns that the loss of forests, increasing construction of roads and dams, urban growth, agricultural expansion, mining, and pollution of coastal waters are causing major rises in the incidence of infectious diseases, including the appearance in humans of diseases such as Nipah, which had previously been found only in animals. (February 2005) Ref. 830

World Health Organization: Stress Environmental Impact on Human Health
The World Health Organization published a report showing correlation between disease and environmental factors for the first time at country levels. The analysis reveals that reducing environmental risks including pollution, unsafe water, ultraviolet radiation, and climate change could save 13 million lives per year. WHO estimates that in some countries, more than one third of the disease burden could be prevented through environmental improvements. Each country profile provide an overview of the health risks caused by the specific environmental situation of the country, thus helping policy making in setting priorities for disease prevention. (June 2007) Ref. 831

WHO Launched Website on Environmental Health in Emergencies
The ‘Environmental health in emergencies’ website launched by the World Health Organization (WHO) provides information and resources for health management related to environmental disasters and emergency situations. Topics include: natural events, technological incidents, complex emergencies, prevention, preparedness and detection, and response and recovery. The subordinate web pages have links to websites and sources specific for different domains. WHO estimates that, in some countries, more than one third of the disease burden could be prevented through environmental improvements. [See also World Health Organization: Stress Environmental Impact on Human Health in June 2007 environmental security report.] (January 2007) Ref.832

WHO Report 2007 Addresses Global Health Security Threats
*The World Health Report 2007 - A safer future: global public health security in the 21st century* addresses for the first time health issues as security issues. It notes the increasing risk of disease outbreaks, epidemics, industrial accidents, natural disasters and other health emergencies, which could become threats to global public health security. The report explains the role of the International Health Regulations, which came into force this year, in helping countries’ collaboration to identify and contain risks from outbreaks and other health hazards. The report points out pandemic influenza as the most feared threat to health security. (August 2007) Ref.833

Environment and Human Health Integration
*Integrating Environment and Human Health*, and *Climate, Poverty and Health: Time for Preventive Medicine* published by the National Council for Science and the Environment (NCSE) address the interconnection between human health and environmental components. The recommendations include: interdisciplinary approaches for better integration of environmental and health perspectives; improved communication between environmental and health communities, and between scientists and decision makers and the public; and improving priority setting in science. The NCSE activities in this area are continuing. (March 2008) Ref.834
World Network of Regional CDC-like Organizations Proposed
During the EU/US Symposium: Transatlantic Cooperation on Combating Bioterrorism, The idea of a world network of regional CDC-like organizations was proposed as a necessary element of combating the effects of bioterrorism. Initially a European CDC was proposed, but since a global system is really required, the conversation quickly moved to suggesting one for each region of the world. (November 2003) Ref.835

Global Health Security Initiative Upgrades Its Strategic Policy Process
The eighth ministerial meeting of the Global Health Security Initiative reviewed the risks and threats of highest priority to global health security, such as chemical, biological, and radio-nuclear terrorism, and pandemic influenza and agreed on a strategy for addressing them. In that view, the group decided “to strengthen its role as a policy forum by identifying emerging issues and coordinating policy development processes to address chemical, biological and radio-nuclear threats” and to strengthen its network and communication capacities. The Global Health Security Initiative is an informal effort involving top health officials from Canada, France, Germany, Italy, Japan, Mexico, UK, U.S., and the E.U. [See also Asian New Strategy to Improve Health and Environment in August 2007, Proposed Global Early Warning System for Monitoring Pandemics in May 2007, and other related environmental security reports.] (November 2007) Ref.836

Proposed Global Early Warning System for Monitoring Pandemics
Scientists propose a global early warning system to monitor possible pandemic outbreaks. A recent study led by Nathan Wolfe, professor of epidemiology at the University of California, Los Angeles, revealed that the “emergence of the major diseases of humanity is not a random process.” Understanding the patterns between origins of major infectious diseases in temperate and tropical countries and individuals exposed to wild or domestic animals might help prevent eventual migration to humans, as well as forecast and avoid eventual pandemics. Delegates to the 59th World Health Assembly also stressed the importance of rapid, worldwide sharing of knowledge on diseases, since “in a globalized world, health issues have an impact on the collective security of people around the world.” (May 2007) Ref. 837

A Community Guide to Environmental Health Available for Liaison Activities
The Hesperian Foundation is making available A Community Guide to Environmental Health, a tool kit for communities working on environmental problems. According to the announcement, the new work “is a collection of best practices from communities worldwide that address both the immediate symptoms of environmental threats as well as the root causes of environmental problems” and “contains numerous easy to follow actions and educational activities, ranging from the simple to the more complex based on a community’s needs and resources.” (June 2008) Ref.838

WHO-sponsored pandemic flu task force holds first meeting in Geneva
The Ad Hoc Influenza Pandemic Task Force held its first meeting to discuss best actions in case of an outbreak. The Task Force is providing independent risk assessments and advising WHO on possible measures to be taken. These could include rapid containment effort, warning governments of risks and accelerating vaccine production. The Task Force includes 21 experts and will function until June 15, 2007, when WHO's revised International Health Regulations
come into effect. (October 2006) Ref.839

Avian Influenza840

Worries over Avian Influenza Pandemic Increase

Lee Jong-wook, the head of the World Health Organization, has predicted that the avian flu virus will mutate so as to make the disease transmissible from human to human, and says that the world has no time to waste to stop it becoming a pandemic. "The pandemic is likely to be like the seasonal influenza, which is much more infectious than the SARS virus," said Dr Hitoshi Oshitani, who ran the battle against SARS and now leads the fight against avian flu in Asia. The United States is working to rally states behind a new U.S. plan to fight the disease, and Canada will host a major international conference in October to discuss how ready the world is to combat a likely pandemic. Concerns are increasing even more as strains of the virus in Asia seem to be becoming resistant to amantadine, a widely used drug for human cases, possibly because farmers are giving it as a preventative to poultry. It has also been shown that strains less dangerous than H5N1 can be transmitted from birds to people. An important achievement is that scientists in Singapore have developed a test kit that can detect the gene specific to the H5N1 strain (so both in animals and humans) within four hours, compared to the several days that it takes with present lab tests. This might help a lot in controlling the spread of the virus. [See also Avian Influenza New Developments in April 2005 environmental security report.] (September 2005) Ref.841

Bird Flu Spreads Increasing Threats of a Human Pandemic

Bird flu is spreading around the world with new cases confirmed in Europe and—as feared—in Africa, where poverty and disease, and humans' intimate proximity to poultry increases the potential of a human pandemic. Scientists argue that since a global flu pandemic cannot be avoided solely by containing an outbreak at its source, plans should focus on how to limit the chance of pandemic-forming viruses emerging in the first place. There are also debates that migrating wild birds might not be the only cause of the worldwide spread. Dr. David Nabarro, the UN System Coordinator for Avian and Human Influenza, sketched a framework of a global four-prong approach to control the spread of the deadly avian influenza virus, highlighting the different roles of governments, civil society, the private sector, and the media. [See also Bird Flu Updates in November 2005 and other previous environmental security reports on this issue.] (February 2006) Ref. 842

Avian Flu Updates

Comprehensive roundups of the latest news on the spread of the bird flu virus and the threat to human health map the cases by countries, and identify actions to counter its spread and effects. Noteworthy actions are the UN Food and Agriculture Organization effort in assembling a 'task force' of health and veterinary specialists to help Indonesia face bird flu; efforts to find/test a vaccine that might be efficient both for birds and humans; the pledge of health ministers from 30 countries to coordinate efforts to fight an eventual influenza pandemic; and some countries (as the UK) commitment to have vaccine for every person in the country. [See also Worries over Avian Influenza Pandemic Increase in September, and Avian Influenza New Developments in April 2005 environmental security reports.] [October 2005. Military Implications; Sources]

Although much is going on worldwide on this issue, the following are some noteworthy
activities and updates on avian flu: The Convention on Migratory Species (CMS) and UNEP are developing a bird flu early warning system based on mapping the different migratory birds’ itineraries and timing. This would alert countries and communities and would provide advice on potential hot spot areas, increasing the possibility of preparedness and strategy development.

The number of H5N1 human infections is rising in Asia, and the disease seems to be spreading in animals in Asia. It has also been identified in parts of Europe and North America. World health officials from more than 100 nations met November 7-9 at WHO headquarters in Geneva, to design a concrete global action plan to counter the threat of a possible avian influenza pandemic among humans. The plan outlines a six-point global action plan for countering any eventual pandemic: improved control at source; rapid detection and response; rapid containment; building and strengthening national pandemic preparedness and response plans; integrated cross-sector country plans for coordinated technical and financial support; and factual and transparent communication.

Strategies for combating the avian flu were also on the agenda of the G-7 and WHO meeting on global health risks and threats of WMD, held in Rome.

The seven member countries of the South Asian Association for Regional Cooperation agreed to create two regional centers to detect and respond to natural disasters and emerging health threats such as bird flu. A regional center for disaster preparation, emergency relief, and rehabilitation will be set up in India and the disease surveillance center will be in Bangladesh. Member countries will also develop a regional strategy for facing infectious diseases.

While these meetings and strategies are focusing mainly on human health, veterinarian and environmental scientists, emphasizing the interconnectedness between the nature of animal and human health, are advocating that maintaining healthy ecosystems is the best and most important strategy of defense against pathogens. [See also Avian Flu Update in October 2005 and other related items on the same issue in previous environmental security reports.] (November 2006) Ref.843

Bird Flu Outbreak Causes Urge for World Readiness

The H5N1 virus has killed at least 42 people in Asia in 2004, including 30 in Vietnam. WHO warned at mid-January that the bird flu virus was endemic in Asia and it appeared to be evolving towards a possible human outbreak. The "New England Journal of Medicine" reported this month on the first documented human-to-human transmitted case of bird flu, which occurred in Thailand last September. Infectious disease experts warn that the H5N1 virus could be more dangerous than SARS, as an H5N1 infected victim could appear healthy even while carrying the virus. The outbreak of the deadly virus in Asia prompted the EU to check Europe's preparedness to cope with an eventual pandemic. (January 2005)

Bird flu Will be a Much Bigger Killer than SARS, According to WHO

WHO's director of their Western Pacific Regional Office said that the conservative estimate is that bird flu (H5N1) could infect 30% of the world, killing 2-7 million people, but it could go as high as 50 million deaths. SARS killed 800 people last year with a mortality rate of around 15%, while H5N1 kills up to 33%. The Asian practice of selling live chickens and ducks, and slaughtering them in front of customers, should be stopped, and a central abattoir or restriction of slaughtering to a few areas should be substituted. Hong Kong scientists have been fighting to end the widespread practice of killing live chickens in markets since 1997, when the H5N1 virus first spread to humans and killed six people in the territory.
Although bird flu has killed 32 people in Thailand and Vietnam this year, and millions of chickens, ducks and other birds have been culled across Asia, the virus is expected to mutate, allowing it to infect human populations with no immunity. The next indicator of this possibility is expected to be increased infections among pigs. Clinical trials for a vaccine against H5N1 have begun, but even successful results might still have a time lag of half a year, while many humans could be infected and killed. (November 2005)

Avian Flu Danger at Rise
According to CDC Director Dr. Julie Gerberding, the avian flu is the "most important threat that we are facing right now." Recent evidence that the avian flu can move between species increases the concern that large-scale human-to-human transmission is possible, and could lead to a pandemic if the virus mutates. A new National Academy of Sciences study of the 2003 bird flu outbreak in the Netherlands confirmed that the avian influenza virus could spread from human to human. The study published in the January/February 2005 issue of the Journal of the American Medical Association shows that both direct and indirect transmission of the virus is possible (over half of those who worked directly with infected birds, and nearly two-thirds of people who had direct contact with farmers tested positive for bird flu antibodies.) Japanese researchers found flies infected with H5N1 virus after the 2004 outbreak among chickens in Japan.

Veterinary officials from 28 countries participating to the recent international conference on avian influenza in Asia also stressed the gravity of the situation and concluded by calling upon the governments in the region and the international community to make combating bird flu a top priority and examine the likelihood of an influenza pandemic and strategies for prevention and response. Shigeru Omi, chief of WHO Asia, warned “the world is now in the gravest possible danger of a pandemic.” The conference was held on February 23-25 in Ho Chi Minh City, Viet Nam, jointly organized by the UN FAO, the World Organization for Animal Health (OIE), and the WHO. (February 2005)

New Worldwide Avian Influenza Network (OFFLU)
At the recent international conference on bird flu held in Paris, the World Organization for Animal Health (OIE), the Food and Agriculture Organization (FAO), and the World Health Organization (WHO) launched the new Worldwide Avian Influenza Network (OFFLU) to improve health security by a better collaboration between veterinary and public health services at local, regional and global levels. Reference laboratories specializing in avian influenza in animals will be coordinated by OIE and FAO, and laboratory networks focusing on human influenza will be coordinated by WHO. Also at the conference, the Democratic People's Republic of Korea has formally requested assistance from the international community for fighting avian influenza. On April 25th, it was announced that the outbreak has been successfully contained.

Europe Drafts New Law To Control Bird Flu Epidemics
The European Commission adopted a draft Directive for a law to control bird flu viruses. The new legislation will require EU states to introduce and reinforce surveillance and control measures against low pathogenicity viruses, in order to prevent mutation into a more harmful strain, mostly one that would be transmissible between humans. The new law is expected to enter into force January 1, 2007, replacing the existing one.
Bird Flu less Deadly but more Infectious
The human mortality rate from bird flu in Vietnam dropped considerably over the past year, from about 70% of the people with confirmed cases, to about 20%. The good news is that avian influenza seems to be less deadly than was thought. The downside of the news is that the virus might be more infectious, increasing the probability of an outbreak in Southeast Asia and, hence, worldwide. The fact that people can be infected/carry the virus without even showing symptoms further aggravates the situation and alarms international health organizations. (April 2005) Ref. 844

Two Viral Diseases Lie in Wait
A new genus, Henipavirus, has been created for the Hendra and Nipah viruses, causes of serious disease outbreaks in humans and livestock in Australia, Malaysia, Singapore and Bangladesh. Like avian flu, so far these diseases have not shown human-to-human transmission (the primary vector is the fruit bat; an immediate one is swine), and they do not appear to be as contagious in animal-human contacts, but the human death rate was 40% in a Nipah epidemic in Malaysia. (December 2005) Ref. 845

The Threat of Pandemic Influenza: Are We Ready? Workshop Summary (2005)
The Institute of Medicine of the National Academies published summaries of the workshop held June 16-17, 2004, addressing the increased concern about the prospect of an influenza pandemic and exploring the issues that must be resolved to prepare and protect the global community. The summary report, The Threat of Pandemic Influenza: Are We Ready? outlines lessons learned from previous influenza pandemics; the avian influenza outbreak in Asia and its implications for human health; influenza pandemic preparedness strategies and planning opportunities and obstacles in different domains and geographical levels.

This month a Vietnamese family of five was infected by Asia's bird flu epidemic, which has killed 49 people since the end of 2003.

Although North Korea has confirmed initial cases of bird flu, South Korean officials suspect that it is far more widespread and is taking steps to protect its border with its northern neighbor. (May 2005) Ref. 846

Europe Embarks on Environment and Health Action Plan
The European Commission has launched an action plan for the period 2004-2010 to reduce pollution health impacts. The new EU system will be focusing on a better understanding of the link between the environment and health, by integrating information on the state of the environment, the ecosystem and human health, and also addressing the eventual effect of emerging environmental issues on health. (June 2004) Ref. 847

New UN Office Using Space Technology to Assist Mitigation of Disasters
A new UN Outer Space Affairs office (UNOOSA) has opened in Bonn, Germany, as part of a future network dedicated to carrying out the UN Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). Providing universal access to space-based information to all countries and relevant organizations, UN-SPIDER covers all stages of disaster, including risk reduction. The program will improve disaster management and help developing countries strengthen their institutional capacities. UN-SPIDER offices are also scheduled to open in Beijing and Geneva. [See also Space Technology for Improving Planetary
Knowledge and Security in April 2006, and other related items in previous environmental
security reports.] (November 2007) Ref.848

Antigenic Maps Help Trace Development of Diseases
Derek Smith, professor of infectious disease informatics at Cambridge University’s Department
of Zoology, and colleagues at Los Alamos National Laboratory and Erasmus Medical Center in
Rotterdam, have developed software that, according to a Scientific American article, “create[s]
an antigenic [stimulates the production of antibodies] map that documents 13,000 human flu
strains isolated over the past five years When these results are plotted on a digital antigenic map,
researchers can see in fine detail how the body’s immune system responds to different mutations
of the virus.” (April 2008) Ref.849

Google to Support Development of Early Warning System in Vulnerable Regions
Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to
ten years, announced $25 million in grants aimed at addressing global challenges. One of the five
core initiatives, ‘Predict and Prevent’ aims to empower communities to predict and prevent
ecological, health or social crises before they become local, regional, or global crises, by
identifying ‘hot spots’ and enabling rapid response. InSTEDD (Innovative Support to Emergencies,
Diseases and Disasters) is allocated $5 million to improve early detection, preparedness, and
response capabilities for global health threats and humanitarian crises. Other recipients in this
category include the Global Health and Security Initiative (GHSI) and Clark University. (January
2008) Ref.850

Nationwide Health Information Network Could Help in Environmental Emergencies
According to information from Indiana University, “Investigators from the Regenstrief Institute
[on the campus of Indiana University’s School of Medicine in Indianapolis] have led a
demonstration of how health information exchange technologies developed and tested regionally
can be used to securely share patient information across the nation during an emergency.” The
demo was based on the HHS-supported trial implementation of a Nationwide Health Information
Network (NHIN). (September 2008) Ref.851

ENERGY SECURITY

New International Renewable Energy Agency Opens in January
The International Renewable Energy Agency (IRENA) will be established January 26th in Bonn,
Germany, as an intergovernmental organization to promote renewable energy worldwide. It will
assist member countries in matters of technology transfer, assessment and dissemination of
information on new technologies and best practices, and will help support projects related to
renewable energy and tackling global warming. All interested UN member states are invited to
become members of IRENA at the Founding Conference in January. The Japanese government
decided to join, stating that the agency’s functions overlap those of the International Energy
Agency. The organization was initially promoted by Denmark, Germany, and Spain, with strong
support from other countries. (December 2008) Ref. 853

An International Energy and Environmental Security Foresight Network
The Energy and Environmental Security Ecosystem (EESE) is a project initiated by the U.S.
Energy Department’s intelligence and counterintelligence unit, for compiling and sharing intelligence and improving understanding of possible security implications of energy and environmental security issues. It will involve a coalition of countries and will consist of a members-only website for selected government, industry and expert representatives, and eventual face-to-face meetings. “The character of the energy and environmental security challenge requires a radically different, more globally systemic process,” says a report by Natural Resources Canada, mentioning the EESE project. Countries involved or interested include Australia, Bangladesh, Brazil Canada, China, France, Germany, India, Italy, the Netherlands, Sweden and the U.S. Others may join later. The project is to be launched in the first half of 2009. (November 2008) Ref.854

Trends of Energy Use in IEA Countries
The International Energy Agency’s Energy Use in the New Millennium: Trends in IEA Countries is an analysis of trends in energy use and efficiency, as well as CO2 emissions in IEA countries. It concludes that the rate of energy efficiency improvement is too slow compared to increasing energy demands and it should at least double for a sustainable energy future and reduced impact on climate change. Rich in indicators on current energy use and CO2 emission patterns, the report is a good tool for policymakers for setting priorities for future actions. (September 2007) Ref.855

World Energy Outlook 2008
World Energy Outlook 2008 is the authoritative report on energy prospects. The WEO-2008 provides new energy projections to 2030 by regions and fuel types. It focuses on the two sectors that it considers the most pressing today: oil and gas production, including future global oil and gas supply and post-2012 climate scenarios, including possible outcomes of the international negotiations and carbon schemes and implications for global energy markets. (November 2008) Ref. 856

EU Energy and Climate Change Policy
The European Council adopted its new Energy Policy to reduce CO2 emissions by 20% of 1990 levels by 2020—a target that could rise to 30% if the U.S., China, and other economic powers agreed to comparable reductions; and by 2020 to have 20% if its energy from renewable sources and 10% of its transport fuel be biofuels. The EU Conference of Presidents decided on March 15 to set up a temporary committee on climate change to provide clear information and suggest strategies to address the issue.

On March 28, the Commission unveiled its “green taxes” strategy that suggests splitting the EU-wide minimum excise duties into an energy tax and an environmental tax to reflect products’ impact on the environment and encourage environmentally friendly goods. [See also EU Plans Tougher CO2 Emissions Cuts in February 2007, and New European Energy Policy Developments in March 2006 environmental security reports.]

Britain’s draft Climate Change Bill is pushing for a drastic emissions’ reduction policy and could make the country the first to limit greenhouse gases by law. The proposal—to become law next year if it passes public and parliamentary consultation—stipulates that an independent panel should set a "carbon budget" every five years, with the goal to cut CO2 emissions by 60% by 2050, from 1990 levels, and between 26% and 32% by 2020. Governments that miss the set target could be held liable. (March 2007) Ref. 857
**World Energy Outlook 2006 Warns on Energy Security and Environmental Implications of Increasing Energy Demands**

The IEA’s *World Energy Outlook 2006*, looking ahead to 2030, names two major issues facing the world over the next 24 years: the threat of “insecure” and “inadequate” energy supplies at reasonable prices, and environmental damages caused by increasing energy demands. The report also suggests that the solutions to these problems are cost effective and reiterates that investment in cleaner energy supplies and more efficient use of energy are vital to cutting energy demand by a significant margin – 10% by 2030. The report notes that energy demand will rise 53% by 2030 and increased nuclear energy and biofuel use are vital to cutting emissions. (November 2006) Ref. 858

**World Energy Outlook 2005 -- Middle East and North Africa Insights**

The *World Energy Outlook* is accepted as the most comprehensive source of statistics, projections, and analysis in the energy sector. If energy trends follow the business as usual policy, Middle Eastern and North African oil and gas resources seem critical for meeting the world's future energy needs. This year’s *World Energy Outlook* focuses on whether the energy production from these key regions will be able to satisfy global demand over the next 25 years. It assesses energy demand and supply trends for the entire regions; analyzes the implications of these trends for global energy markets, international oil and gas prices and energy security; presents a "Deferred Investment Scenario' and its consequences; and reviews the region’s power and water desalination sectors. (November 2005) Ref. 859

**Energy and Security: Toward a New Foreign Policy Strategy**

Although focusing on America’s energy dependency on oil, the book assesses the world’s prospective on oil and gas, the key and most sensitive energy sources for the near future. A contribution of 36 top foreign policy and energy experts, sometimes with divergent opinion, *Energy and Security: Toward a New Foreign Policy Strategy* suggests new strategies and policy approaches that could mitigate the risks implied by continued dependence on oil. (October 2005) Ref. 860

**North American Trilateral Agreement for Energy Security and the Environment**

Energy ministers for Canada, Mexico and the U.S. endorsed the first trilateral agreement on energy science and technology—a framework designed to enhance North American energy security and environmental protection. It focuses on cooperation in energy science and technology to increase energy efficiency and advance clean energy technologies across North America and the world. Energy security will also be high on the agenda of the North American Leaders’ Summit to be held August 20-21 in Montebello, Quebec. (July 2007) Ref.861

**Increasing Oil Demand in China and India Raise Security Concerns**

The hunger for energy might become a driving force for some countries to disregard international security issues and accords to the point of jeopardizing international security. For example, there were international concerns expressed about the alleged Chinese offers of arms and other sensitive defense technology in return for oil and gas rights in certain countries. “Unprecedented political opposition” probably triggered by strategic concerns in the US Congress forced the withdrawal of China National Offshore Oil Corporation (CNOOC)'s bid for
California's Unocal. Similar concerns may affect the rival bids of China and India to buy a Canadian firm with oil fields in Kazakhstan. (August 2005) Ref. 862

**China’s Climate Change and S&T Action Plan**  
China launched its first national climate change program in June 2007. Although it does not include mandatory caps on emissions, it shows a strong commitment to reducing greenhouse gas emissions. The program highlights some major targets and actions to achieve them by 2010: reducing energy consumption by about 20% per GDP unit; increasing the share of renewable energy to 10% of the primary energy supply; keeping emissions of nitrous oxide from industrial processes at 2005 levels; increasing reforestation by 20%, and increasing international cooperation. The program notes that “China’s energy efficiency is about 10% lower than that of the developed countries, and its per unit energy consumption of energy-intensive products is about 40% higher than the advanced international level. Science and technology are the ultimate resort for humankind to tackle climate change.” In view of this, the Chinese Ministry of Science and Technology has released an action plan for the science and technology (S&T) aspects of China's new climate change initiative.

Note: The Chinese State Environmental Protection Administration report released in June reveals a continuous deterioration of air and water quality in Chinese cities despite national efforts to reduce pollution levels. Concomitantly, preliminary estimates by the Netherlands Environmental Assessment Agency reveal that in 2006 China surpassed the U.S., becoming the world’s largest CO₂ emitter. (June 2007) Ref.863

**China's Energy Conditions and Policies—White Paper**  
China’s Information Office of the State Council issued the country’s first-ever, white paper on its energy conditions and policies. The paper indicates a shift towards a more environment-centered energy policy, prioritizing sustainable development based on S&T, and strengthened international cooperation in the field of energy. It emphasizes, “China did not, does not and will not pose any threat to the world’s energy security.” [See also China May Restructure Environmental Effort in October 2007, and other related items in previous environmental security reports.] (December 2007) Ref.864

**European Action Plan on Energy Efficiency**  
The European Commission outlined its Energy Efficiency Action Plan (EEAP) to cut Europe's energy consumption by 20% before 2020. It includes over 75 measures including new energy efficiency standards, and more energy-efficient products and services. The action plan will be introduced over the next six years and targets several priority areas, including: energy-efficiency labeling, possible legislation for meeting car emissions targets; encouraging investment in energy efficiency; more efficient power plants and energy transmission systems; and energy saving taxes and incentives. [See also New European Energy Policy Developments in March 2006 environmental security report.] (October 2006) Ref.865

**European Commission’s New Low-carbon 20/20/20 by 2020 Energy Plan**  
The European Commission has proposed a package of measures to reach its “20/20/20 by 2020” targets — produce 20% of its energy from renewable sources and increase energy efficiency by 20%, cut greenhouse gas emissions by 20% of 1990 levels (or 30% in case of a global accord), and considerably reduce reliance on energy imports. The detailed roadmap includes specific
renewable energy and CO\textsubscript{2} emission targets for each EU member state; new rules for carbon sequestration; and an updated Emissions Trading System for fair greenhouse gas emissions cuts for different emitters, with the aim of gradually including all industries in the emissions auction scheme. The Commission's proposals have to be endorsed by the European Council and Parliament, with the final package expected to come into force by the end of 2009. The European Commission hopes that the plan will trigger strong momentum towards a global agreement. Meantime, the European Commission is also considering introducing a climate tax on imports from states failing to tackle greenhouse gas emissions, and toughening EU's emission trading system. [See also \textit{EU Energy and Climate Change Policy} in March 2007 environmental security report.] (January 2008) Ref.866

**New European Energy Policy Developments**

A European Commission new Green Paper sets the basis for a common energy strategy for the 25-nation European Union, since energy security and the fight against climate change are common challenges and therefore should be addressed by common and coordinated efforts. The paper includes six specific priority areas with over 20 suggestions: establishing an internal EU energy market; solidarity among EU Member States, including setting up a European Energy Supply Observatory and revision of the present supply framework; a sustainable, efficient, and diverse energy mix (“This in turn may eventually lead to objectives being established at Community level regarding the EU’s overall energy mix to ensure security of supply, whilst respecting the right of Member States to make their own energy choices” states the EU Press Release); global warming response, including an Action Plan on energy efficiency to be adopted by the Commission later this year; strategic energy technology plan that would assure EU competitiveness for efficient and low-emission technologies; and a common external energy policy to reflect an EU common view in the international arena, including a new Community mechanism to enable rapid and coordinated reactions to emergency external energy supply situations.

In order to reduce dependency on non-European countries’ energy sources, European leaders are planning to raise the share of energy generated from renewables from 12% to 15% by 2010 and increasing the proportion of biofuels used in transport from the 5.75% target by 2010 to 8% by 2015. Meanwhile, the EC’s "Euro 5" proposal seeks to impose stricter rules on new car emissions, calling for diesel particulates to be cut by 80%, gasoline hydrocarbons by 25%, and, for both gasoline and diesel, NO\textsubscript{X} cut by 20%. Individual countries advocate even stronger measures. The new standards, if approved, could enter into force in mid-2008. (March 2006) Ref. 867

**EU Commission Sets Long-term Energy Goals**

In April the EU Parliament's Industry Committee approved raising the 2006-2015 energy reduction goal from 10% to 11.5%. This month the EU Executive Commission set an objective of 20% reduction by 2020, saving €60B per year in fuel costs. New EU laws requiring efficient buildings and appliances may achieve half the goal, but additional measures will be needed. A group of legislators went further, calling for a goal of 23% reduction. [See \textit{EU to Set Higher Targets for Cuts in Energy Consumption} in April 2005 environmental security report.] (June 2005) Ref. 868
**Prevention and Adaptation**

**Adaptation Needs and Actions**

The Least Developed Countries Fund, established under the UNFCCC and managed by the Global Environment Facility to help the poorest countries implement urgent projects to adapt to climate change, might need $1 billion, said Boni Biagini, who runs the fund. So far, only $172 million was pledged to the fund. Nevertheless, the Central Emergency Response Fund, set up in 2006 to help in case of natural and man-made disasters, has surpassed its annual target, reaching $452.5 million, with some of the 101 contributing nations significantly increasing their donations for 2009, announced the UN Office for the Coordination of Humanitarian Affairs.

Meanwhile, at the Poznan climate change conference, it was agreed that the board of the Kyoto Protocol’s Adaptation Fund would have the legal capacity to grant developing countries direct access to about $60 million to help them cope with the effects of global warming. However, the suggestion by some delegates to increase from 2% to 3% the share of proceeds from the Clean Development Mechanism that finances the Adaptation Fund was rejected. The UN estimates that $86 billion per year might be needed by 2015 for poor countries to adapt to global warming, while some aid groups are calling for at least $50 billion.

At the Third Asian Ministerial Conference on Disaster Risk Reduction held in Kuala Lumpur, Malaysia, government officials from more than 40 Asian countries discussed partnerships and regional cooperation for disaster preparedness and early warning systems. The Asia-Pacific region is the most populous and also most affected by disasters in terms of human and economic impacts, according to the UN International Strategy for Disaster Reduction. Greater investment in disaster risk reduction is crucial for the region’s development and to reduce relief costs, since studies show that $1 invested in disaster preparedness saves between $4 and $7 in humanitarian relief and reconstruction costs after a disaster happens.

The UN Disaster Assessment and Coordination (UNDAC) organized disaster-awareness training programs in Russia for members of the Commonwealth of Independent States and in the Middle East. In 2009 it will do so in the West African region. All countries, which join the system, must receive the training. Since its inception in 1993, UNDAC has deployed 183 missions to assist countries affected by disasters. (December 2008) Ref. 871

Indonesia launched a sophisticated new tsunami warning system that runs a computer-simulated model and can predict waves’ arrival times and heights, enabling fast emergency measures. Although it will take some more years to cover all the coastal regions, the construction of the system is ahead of the 2010 completion target and was able to predict the tidal wave that struck the Sumatran coast in September.

An ‘adaptation scan’ developed by Tauw and BuildDesk of the Netherlands could help policymakers assess the effects of climate change in their respective areas. It operates using complex combinations of two databases—one with effects and the other with measures, and generates several direct and indirect possible consequences.

Preparations of coastal communities for addressing possible natural disasters are increasing across the globe. The UK has commissioned a study on towns vulnerable to flooding. California is starting a series of adaptation efforts including moving a highway farther inland and constructing flood-resistant buildings. An Alaska village is planning to move their entire community due to rising sea levels. The coasts of New Jersey and New York City have to
prepare to be radically altered by 2100. The Netherlands is considering a proposal to build islands off the coast like barrier reefs to deal with rising waters. Australia and Indonesia are in talks to create a center to prepare the region to deal with natural disasters. The coasts of Bangladesh, and of Gujarat in India, are already changing and, as a result, some families are moving. The EU pledged to provide technical and financial assistance to Pacific nations affected by climate change.

The sixteenth Asia-Pacific Economic Cooperation (APEC) forum adopted a declaration to enhance cooperation for improving risk reduction, preparedness, and management to fight climate change, including building domestic disaster management capabilities. (November 2008) Ref. 872

“The UN estimates that all but one of its emergency appeals for humanitarian aid in 2007 were climate related,” notes the *Climate Change and International Security* report.

The Kyoto Protocol’s Adaptation Fund Board held its inaugural meeting in Bonn, Germany, on March 28, 2008. The Fund will finance concrete adaptation projects and programs in developing countries. The fund now estimated at about $58.4 million is expected to increase to $80-300 million over 2008-2012. The finance source is a 2% levy of the Clean Development Mechanism, so it is “not reliant on donor funding or overseas development assistance. This is the climate regime beginning to become self-financing,” noted Yvo de Boer, Executive Secretary of the UN Framework Convention on Climate Change.

The Caribbean states agreed to set up a joint tsunami early warning center by 2010. The center will relay information from national geological institutes across the region. Barbados, Puerto Rico, and Venezuela were named as possible hosts of the center, which would have a $250,000 annual budget funded by national governments, France, the U.S., and UNESCO. (March 2008) Ref. 873

Scientists are increasing efforts to assess the ‘hot spots’ that will be most affected by climate change in order to orient policy making and businesses to help those areas to adapt and cope with new challenges. Investors are already funding projects ranging from new agriculture practices and flood defense systems to renewable energy sources. In Australia, where drought might become the rule and fresh water is already scarce, nearly every major coastal city has a desalination plant, with some, like Perth, with almost all fresh water coming from the ocean, and Melbourne and Sydney soon to desalinate 20%. The energy required by desalination will be mostly green.

Over half of the Republic of Maldives' 200 inhabited islands are eroding at an alarming rate, in some cases forcing relocation of entire island communities. Adaptation actions began already, by raising a massive seawall made of concrete tetrapods that surrounds the entire capital of Malé, and even constructing new artificial, taller islands, such as Hulhumalé. (January 2008) Ref.874

“It is now recognized that mitigation alone is unlikely to fully address, in a reasonable time, the challenges that human-induced climate change is likely to bring and that, therefore, much greater needs to be given to adaptation to climate change,” said WMO Secretary-General Michel Jarraud, addressing the UN Climate Change Conference in Bali, Indonesia.

Small island states called for help with adaptation programs. Grenada mentioned that the two devastating hurricanes over the last seven years caused damage that amounted to 200% of the country’s GDP. Maldives is spending considerable sums on adaptation efforts, which include
building 14 ‘safe islands.’

The Bali roadmap includes, as key issues for the upcoming negotiations, taking action to adapt to the negative consequences of climate change—such as droughts and floods; developing ways to reduce greenhouse gas emissions; finding ways to deploy climate-friendly technology; and financing adaptation and mitigation measures.

At the "Emergency Preparedness and Response Workshop" organized by the UN Office for the Coordination of Humanitarian Affairs (OCHA) in Johannesburg, eight South African and Indian Ocean nations—the Comoros, Madagascar, Malawi, Mozambique, Namibia, Zambia, Zimbabwe and South Africa—decided to enhance regional cooperation for emergency response in case of natural disasters. The draft Declaration of Intent stipulates cooperation for improved information sharing, establishing regional rapid response teams, and developing measures for free movement of emergency personnel and relief materials in the region.

The first international symposium on public weather services, organized by the WMO has brought together about 120 experts to prepare a road map for improving communities’ protection from natural disasters and adaptation to climate change. The discussions covered issues from weather information gathering and dissemination by national meteorological and hydrological services, to use of weather forecasts and reaction in case of emergencies. The symposium was held in Geneva, 3-5 December 2007.

The UN International Telecommunications Union three-day global forum on "Effective Use of Telecommunications/ICT for Disaster Management: Saving Lives" held in Geneva, launched the ITU Framework for Cooperation in Emergencies (IFCE), which outlines actions helping government and relief agencies to improve disaster preparedness, early warning, and response by using telecommunications resources.

The Convention on Biological Diversity, launched a new adaptation website http://adaptation.cbd.int to help governments and agencies to include biodiversity considerations in their adaptation planning. (December 2007) Ref.875

The Fourth Assessment Report (AR4) Summary for Policymakers by the International Panel for Climate Change is a comprehensive scientific assessment of world climate, dedicated to support and encourage policy negotiations and action. It states with “very high confidence” that post-industrial human activities have warming effects, and with “high confidence” that although the impact of global warming may be “abrupt and irreversible”, adequate adaptation and mitigation policies “can significantly reduce the risks of climate change.” It projects that in 2090-2099 relative to 1980-1999, temperature rise could range between 0.3°C and 6.4°C, and sea level rise up to 0.59m—not including important factors such as changes in ice flow. The regions most affected by climate change are the Arctic, Africa, the small islands, and the highly populated Asian and African megadeltas.

The Synthesis Report addresses: 1. Observed changes in climate and their effects (highlighting observations of increases in global temperatures, melting of snow and ice, rising sea level, and health implications); 2. Causes of change (the likely role of anthropogenic warming); 3. Projected climate change and its impacts (different near and long term scenarios depending on climate policies, and examples of some impacts on systems, sectors, and regions) 4. Adaptation and mitigation options (with examples for several sectors of adaptation option/strategy, policies and measures, technologies, constraints and opportunities); and 5. Long-term perspective (key vulnerabilities, risks and threats, as well as scientific and socio-economic aspects relevant to adaptation and mitigation).
The report underlines that “A wide variety of policies and instruments are available to governments to create the incentives for mitigation action. Their applicability depends on national circumstances and sectoral context.” The AR4 was released in Valencia, Spain, on November 17, 2007 and the key findings will be discussed at the December UN Climate Change Conference in Bali. (November 2007) Ref.876

Change in cultivation patterns due to climate change, population growth, increasing oil prices, expansion of biofuels, instability of financial markets, and other economic factors highly affect agricultural commodity prices. Large price fluctuations of agricultural products can have a destabilizing effect on countries’ economies, hindering poverty reduction efforts, potentially even leading to civil rebellion and political instability. The IPCC estimates that in some African countries, yields from rain-fed agriculture would be reduced by 50% due to climate change. According to the UN Food and Agriculture Organization (FAO) Food Outlook report, prices are rising considerably for nearly all major food and feed commodities. Another FAO report, The State of Food and Agriculture 2007, presents a comprehensive assessment of the world’s food situation, including projections up to 2050. ‘Part II - World and Regional Review: a longer term perspective’ highlights the challenges posed to food security by population growth, rapid economic development, increasing demand for biofuels, and climate change. However, FAO’s projections are optimistic, estimating the number of well-nourished people in developing countries to rise from 3.9 billion in 1999–2001 (83% of the population) to 6.2 billion (93%) in 2030, and to 7.2 billion (96%) by 2050. (November 2007) Ref.877

Asia, being one of the continents most affected by climate change, is increasing its efforts for adaptation and disaster management. The UN University launched a 14-week pilot program to help Asian countries in flood risk assessment and planning for and managing floods. A Japanese initiative using satellite data to provide disaster information in Asia could extend its coverage to other developing countries. The Sentinel Asia project, a Japanese initiative using satellite data to provide disaster information in Asia will be expanded to cover more end users in Asia and could be extended to other developing countries in Africa and Latin America. China also offers its expertise and technology for disaster forecasting and management to other developing countries. (October 2007) Ref.878

The 2007 droughts in parts of southern Africa reduced maize production by about 40% to 60%. A workshop of over 140 experts on Adaptation Planning and Strategies organized by the UNFCCC and FAO in Rome underlined the long-term implications of abnormal changes in air temperature and rainfall and the increasing frequency and intensity of drought and floods, mainly on the developing nations. Due to the melting of Himalayan glaciers, the Pakistani government established a high-level committee and a study center to study adaptation strategies, including developing efficient water management systems, raising mass awareness campaigns, and changing cropping patterns. (September 2007) Ref.879

Tackling climate change in the next quarter-century will require major changes to patterns of investment and financial flows, according to the report Investment and financial flows relevant to the development of effective and appropriate international response to Climate Change by the UN Framework Convention on Climate Change. (August 2007) Ref.880
Better Disaster Planning to Avoid Environmental Catastrophes
Hurricane Katrina along the U.S. Gulf Coast has introduced a new term, "toxic gumbo", into the environmental vocabulary, referring to the liquid/sludge produced when storms cause flood waters to overrun populated areas, especially industrial tracts, picking up from storage facilities a hazardous mix of all sorts of chemicals, both end-products and precursors. As the flood recedes, it may deposit this nasty brew over an entire region, including wetlands, and/or carry it into previously unaffected waters. Katrina produced environmental damage and pollution of this kind on an unprecedented scale outside of full-scale war. President Bush has suggested a greater role for the military in post-national disaster management.

On the other side of the Atlantic, spurred by floods and fires in many places around the continent, the European Commission passed a resolution calling for better disaster planning coordination among its members.

The Asian Conference on Disaster Reduction held in Beijing, aims to assess disaster reduction progress across Asia and build a platform for cooperation on early warning, disaster prevention, reduction, and response in Asia.

UN Secretary-General Kofi Annan, reviewing the statistics of 2004 natural disasters, called for more emphasis on actions to prevent and react to natural disasters, “because their incidence and severity is increasing due to climate change, environmental degradation, inappropriate development patterns and inadequate mitigation and preparedness systems.” (September 2005) Ref. 881

OSCE Workshop on Environmental Risks and Security in Earthquake Areas
The Organization for Security and Co-operation in Europe (OSCE) held an international workshop on environmental risks and security in earthquake-prone areas, as part of the preparations for the World Conference on Disaster Reduction to be held in January in Kobe. More than 250 participants from 52 countries addressed such issues as raising public awareness, education and training on social consequences of earthquakes, preparedness, and risk and disaster reduction. Ambassador Vladimir Pryakhin, Head of the OSCE Office in Yerevan said that these issues are “closely linked with the provision of national security to the country and the region.” (November 2004) Ref. 882

Indigenous Peoples Demand More Involvement in Environmental Policies
Climate change was the special focus of the UN Permanent Forum on Indigenous Issues, held in New York, April 21-May 2, 2008. The approximately 3,300 delegates representing the 370 million indigenous people from around the world stressed that indigenous peoples should be included in the international debate on climate change. The Forum suggested that a working group on local adaptation measures and traditional knowledge of indigenous peoples be established, since they can provide important insights for designing and implementing sustainable mitigation and adaptation strategies. (May 2008) Ref.883

UN and Governments of Latin America and the Caribbean Met to Improve Disaster Anticipation and Response System
The First Regional Meeting on Enhancing International Humanitarian Partnerships for Latin America and the Caribbean was held in Mexico City, September 10-11, hosted by the Government of Mexico in collaboration with the Government of Canada and the United Nations
Office for the Coordination of Humanitarian Affairs (OCHA). Participants explored how to improve disaster preparedness and response information and coordination systems among national and regional governments and relief organizations. As a first step, it is “essential to establish the basic compatibility of national response systems with the international system, tools and mechanisms,” said John Holmes, Under-Secretary-General for Humanitarian Affairs and UN Emergency Relief Coordinator. The next regional meeting will be held in Brazil, in 2009. (September 2008) Ref. 884

UK Calls for Worldwide Action for Addressing Global Warming
The British government is intensifying its call for immediate worldwide consensus and action for addressing global warming, which would include the economically booming China and India, even if it would take decades to see the results. The government's chief scientist, Sir David King, warned that, even by the most optimistic forecasts, carbon dioxide levels are set to double those of the pre-industrial era, leading to a three-degree centigrade rise in temperature, jeopardizing eco-systems, raising sea levels and flooding coastal areas, and causing the hunger of 400 million people. The Blair government claims that Britain will exceed the Kyoto Protocol target of 12.5% emissions reductions by 2012, but not its own goal of 20% reduction by 2010, in spite of the plans for stricter emission regulations introduced last month. (April 2006) Ref. 885

UN Framework Convention on Climate Change Conference
About 6,000 scientists, decision-makers, and activists attended the Tenth Session of the Conference of Parties (COP 10) of the UN Framework Convention on Climate Change (to which is attached the Kyoto Protocol) held in Buenos Aires, 6-17 December 2004. The conference discussed ways to reduce global warming and its effects. It also discussed post-Kyoto policy plans. Although no specific actions and/or regulations were adopted, progress was achieved on the issue of mitigation and adaptation to possible effects of climate change. The Buenos Aires Programme of Work on Adaptation and Response Measures adopted by the conference includes further scientific assessments of vulnerabilities and options for adaptation, expert papers on various aspects of climate change risks, and recommendations for sustainable development planning. A seminar of governmental experts is planned for next May in Bonn to continue discussions on the issue. (December 2004) Ref. 886

A Sample of Counter Global Warming Activists around the World
Unless major actions to reduce greenhouse gases are taken worldwide, parts of Australia could become uninhabitable, warned participants at the recent International Climate Change Taskforce meeting. An Australian court has ordered that an expert planning panel assess the greenhouse gas pollution consequences before any extension of the Hazelwood power station in the Australian State of Victoria begins. Environmentalists petitioned that sites in Belize, Nepal and Peru be considered for UNESCO’s World Heritage in Danger List in order to be protected from the effects of climate change. China and the European Commission of the European Union announced a five year, €42.9 million energy and environment program in Beijing to improve energy efficiency in China and combat climate change. Britain and Germany, whose greenhouse gas reductions are among the biggest in the world, are enhancing their fight against global warming through a new partnership backed by leading industrialists, businessmen, and scientists. A range of innovative recommendations for environment-friendly industry will be presented to the countries’ leaders. The importance of the event was highlighted by its opening by Her
Majesty Queen Elizabeth II during her State Visit to Germany. (November 2004) Ref. 887

Nordic Countries Suggest Actions to Cope with Global Warming

Conservation of Nordic Nature in a Changing Climate is a report commissioned by the Nordic Council of Ministers to analyze global warming causes and to address strategies concerning the Nordic Countries' abilities to cope with climate change effects. Experts from environmental research institutes in the five-country region affirm that climate changes are mainly caused by humans and urge the region's governments to take joint action against global warming as well as to design strategies to deal with more extreme weather patterns. The report identifies some concrete strategies and tools for adaptation to climate change effects—such as management and administration aspects, including some regarding “natures’ goods and services.” (October 2005) Ref. 888

EU Climate Change Policy

The European Commission launched a six-month public debate on approaches for adapting to climate change. Citizens, Parliaments, Member States and international partners will contribute views along the lines set by the Green Paper “Adapting to Climate Change in Europe - Options for EU Action” launched in June 2007 [see last month’s report item on Climate Change]. The results, available at the beginning of 2008, will be considered in policymaking and setting priorities for developing a EU adaptation strategy by the end of 2008.

Meantime, UK Foreign Secretary, David Miliband, listed climate change among the UK Foreign Office’s ten ‘strategic priorities’, on a par with consequences of extremism, radicalization, and conflict. He noted that climate change might become the “new raison d’être” for the EU, as “one of the greatest threats to our future prosperity and security… Creating an Environmental Union is as big a challenge in the 21st century as peace in Europe was in the 1950s” he said. (July 2007) Ref.889

European Adaptability to Climate Change is Questioned

A June 15, 2006 report for the Director General for the Environment of the European Commission explores the secondary and tertiary social impacts of climate change and finds that: 1) indirect effects may be more important than the direct effects of climate change (ripple effects of changes in agricultural cycles and changing demands); 2) impacts are likely to be uneven across sectors and communities; and 3) national preparations may not have sufficiently considered the difficulties of those in marginal areas or conditions. (June 2006) Ref. 890

Asia-Pacific to Increase Responses to Climate Change

Anticipating that Asia and the Pacific could be one of the regions most severely affected by climate change, a two-day meeting organized by the UN and other international agencies focused on identifying strategies, business models, and financial frameworks to reduce the impact of climate changes and promote clean energy while pursuing economic growth. Recommendations were made by government policymakers, business leaders, academics, and representatives of NGOs from across the region. Meanwhile, Australia’s opposition Labor Party announced that it would give its poorer neighbors $US132 million to address impacts of climate change. (July 2007) Ref.891
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operational for the entire region by the end of July. A network of 26 national information centers will allow countries to receive and distribute warnings of potential tsunamis. However, the tsunami that struck Indonesia on July 17th, caused by an earthquake off the south coast of Java, killed more than 500 people. Although the wave hit the coast 40 minutes after the quake was detected, no warning was issued to the population. [See also Tsunami Warning and Mitigation System in the Indian Ocean in December 2005, and other related items in previous environmental security reports.] (July 2006) Ref. 896

Regional Governance Key for Tsunami Early Warning and Recovery
The first Network of Regional Governments for Sustainable Development Summit was held at Lake Toba, Indonesia, March 10-12, 2005, under the theme “Global Partnership on Rehabilitation and Reconstruction of Post-Disaster Settlements.” The Lake Toba Call declaration summarizes the agreements reached by the participants, mainly focusing on creating partnerships at the regional level within the UN system for disaster early warning systems and post-disaster rehabilitation, and to guarantee that the local governments could work properly in a network of regional governments to ensure sustainable development not only at local, but also at regional and international levels. (March 2005) Ref. 897

Tsunami Warning and Mitigation System in the Indian Ocean
One year after the December 2004 Indian Ocean tsunami, a Consolidated Report for Countries Affected by the 26 December 2004 Tsunami was released that addresses capacity building requirements at regional, national, and community levels in 16 countries. It identifies the achievements, gaps, and specific actions still needed and the responsible authorities for those actions for building an effective warning and mitigation system for the Indian Ocean countries. The World Meteorological Organization (WMO) announced that a telecommunications network to provide a tsunami early warning system in the Indian Ocean is on track for completion by the middle of 2006. However, as of December 2005, there is no agreement on the establishment of a single alert center and the countries that have been conferring are going ahead with plans for purely national systems. [See also Indian Ocean Tsunami Early Warning System to be Operational by the End of 2005 in August 2005, and Tsunami Triggers an Early Warning System for Indian Ocean and Beyond in January 2005 environmental security reports.] (December 2005) Ref. 898

Tsunami Triggers an Early Warning System for Indian Ocean and Beyond
The Tsunami Warning System in the Indian Ocean, followed by a global one, topped the discussions of the World Conference on Disaster Reduction held in Kobe, Japan, January 18-22, 2005. [See also items Tsunami Triggers an Early Warning System for Indian Ocean of December 2004, and Natural Disasters Raise the Environment on the Global Security Agenda of October 2004 environmental security report.] The tsunami warning system for the Indian Ocean should be launched by June 2006 with the rest of the world to follow a year later, said Koichiro Matsuura, head of UNESCO. UNEP's Executive Director Klaus Toepfer stressed that such a system should be extended to all forms of natural and man-made disasters, including climate change. Grassroots groups were unhappy with the conference’s outcomes, as it failed to set concrete plans of action and targets with political commitment and measures to hold nations accountable for their pledges. Germany plans to hold an international conference later this year on how to enhance early warning systems and limit the damage from natural disasters. It has already hosted two disaster early warning conferences in 1998 and 2003. The EU is considering
setting up an international reaction force made up of about 5,000 experts identified by national
governments, trained together and placed under central co-ordination in an emergency, with
rapid reaction teams in different disaster situations. (January 2005) Ref.899

UN Tsunami Early Warning Systems Extended to Mediterranean, Northeast Atlantic
As part of a global tsunami warning and mitigation system, UNESCO’s Intergovernmental
Oceanographic Commission (IOC) launched the plans for a system for the North-Eastern
Atlantic Ocean, Mediterranean and connected seas. At the first meeting of the new system’s
Intergovernmental Coordination Group, experts from 23 Mediterranean and Northeast Atlantic
countries identified the key technical needs for the system and adopted an action plan for 2006-
2007 with the aim of having an initial operational system in place by December 2007. Beyond
those in the Pacific and Indian Oceans, planning is underway for one in the Caribbean. [See also
Indian Ocean Tsunami Early Warning System to be Operational by the End of 2005 in August
2005, and Tsunami Triggers an Early Warning System for Indian Ocean and Beyond in January
2005 environmental security reports.] (November 2005) Ref.900

China to Launch Climate Adaptation Program
China is preparing to launch its first four-year comprehensive national program to address the
effects of climate change on China. The program, to be launched in two months, will outline
goals for reducing emissions of greenhouse gases and developing green technologies, and
mitigation measures to address the implications of global warming on China's food production
and on coastal cities. A comprehensive report, produced by six Chinese academic and
government organizations, warns that because of continuous temperature rise, China’s grain
production might be reduced by up to 37% in the second half of this century, and water scarcity
increase considerably due to rapidly melting glaciers. (February 2007) Ref.901

U.S. Climate Change Science Program Progress Assessment
Evaluating Progress of the U.S. Climate Change Science Program: Methods and Preliminary
Results by the National Research Council acknowledges advancements made by the CCSP in
documenting and understanding global changes, but finds that more work is needed concerning
regional impacts, human vulnerabilities, and mitigation and adaptation options, as well as
improving communication with stakeholders and decision makers at all levels. Lack of adequate
high-quality data from satellites—crucial to the advancement of climate change science—is
identified as the single greatest threat to the future success of CCSP. (September 2007) Ref.902

Calls for recommitment on ten-year anniversary of U.N. Framework Convention on
Climate Change
Marking the ten-year anniversary of the U.N. Framework Convention on Climate Change, U.N.
Environment Program Executive Director Klaus Toepfer called for rapid ratification of the
Kyoto Protocol that is the framework for how nations should reduce their greenhouse gas
emissions to meet the convention's objective of "stabilization of greenhouse gas concentrations."
U.N. Secretary General Kofi Annan hailed the rise of wind energy use, hybrid vehicles and other
green policies but called for even more efforts since atmospheric concentration of carbon dioxide
has increased 5 percent in the decade since the convention (not the Kyoto Protocol) entered into
force. He also called on those countries that have not yet ratified the protocol to do so, pointing
mainly to Russia. (March 2004) Ref.903
Conference on Resilience Concepts for Large-Scale Disasters

Applications of chaos theory, self-organization, wisdom of the crowds, and other concepts of how to achieve unity of effort in conditions where there is no unity of command in humanitarian assistance and disaster management associated with large-scale social crisis and global change will be discussed at the U.S. Resilience Summit 2008 to be held at the Cosmos Club, 2121 Massachusetts Ave, N.W., Washington, D.C. October 23rd. The meeting is intended to lead to an international summit in 2009; however, some UN and other international participation is expected. According to Michael D. McDonald, President, Global Health Initiatives, Inc. and coordinator for the Resilience Summit, lessons will be drawn from disasters such as Hurricanes Katrina and Ike, the Pakistani earthquake, the Indian Ocean Basin Tsunami, and Cyclone Nargis. Anticipating needs for emerging situations such as in the Philippines, North Korea, Darfur, Somalia, Zimbabwe, Eritrea, Northern Baja California, Nigeria, Mexico City, and US inner cities will also be explored. (September 2008) Ref. 904

Climate Change Computer Modeling

Climate scientists and modelers warn that climate change forecasting abilities are still relatively weak and that some of those considered in policymaking—such as the IPCC assessments—are highly debatable, being too conservative and not taking into account the latest research.

Climate modelers from around the world met at the World Modelling Summit for Climate Prediction, held in Reading (UK), May 6-9, 2008, to try to improve forecasting abilities, including measures that will allow a better understanding of how the climate will be affected locally as well as globally. At the end of the four-day summit, scientists made the case for a climate-prediction project on the scale of the Human Genome Project. A key component of this scheme would be a world climate research facility with computer power far beyond that currently used in the field. (May 2008) Ref.906

A group of climate scientists from NASA and Columbia University Earth Institute found that climate change is “close to critical tipping points, with potentially dangerous consequences for the planet.” In a related interview, Dr. James Hansen of NASA said that the point of no return might be reached as soon as in 10 years, if world governments fail to curb GHG emissions. He also noted that the IPCC report underestimated sea level rise, which, he warns, might reach 1-2 meters by the end of the century, if West Antarctic and Greenland melting are factored in. The Dangerous human-made interference with climate: a GISS modelE Study outlines two scenarios: ‘business-as-usual’, which shows disastrous consequences, and an ‘alternative scenario’ assuming controlled GHG emissions generating more moderate effects. (June 2007) Ref.907

Global warming will increase the risk of natural disasters over the next two centuries, even if harmful emissions were cut now, warn climate scientists from the University of Bristol's Department of Earth Sciences. Compiling data from more than 52 climate models looking at the impact of greenhouse gas emissions, the researchers calculated the risks induced by climate change to the world's key ecosystems based on levels of warming (less than 2°C (3.6°F) to over 3°C (5.4°F)) and for each group assessed the probability of changes in forest cover, the frequency of wildfires, and changes to freshwater supplies over the next 200 years. The findings
are expected to be used to explore measures to reduce hazards as much as possible. (August 2006) Ref.908

A new study, Global temperature change, by a group of scientists, reveals that global surface temperature has increased approx. 0.2°C per decade in the past 30 years, and the world is the warmest it has been in the last 12,000 years. Scientists estimate that pollution from human activity, combined with the loss of snow and ice cover, will accelerate future temperature increase. Also, since warming is not uniform around the globe, the likelihood of strong El Niños and other harsh weather phenomena increases. A global temperature rise of approx. 1°C might represent a threshold with “dangerous” consequences, as sea levels rise and species become extinct. (September 2006) Ref.909

Strong correlation between global warming and severe storms is also revealed by a study based on more than 80 simulations using 22 sophisticated computer models of the climate system. The simulations show with 84% probability that for the period 1906-2005, human activity—mainly greenhouse gas emissions—are responsible for about two-thirds of the temperature increases in hurricane formation regions of the Atlantic and Pacific Oceans. The research team that produced the study includes 19 hurricane and climate scientists from ten research centers. (September 2006) Ref.910

A new index developed by scientists of the Swiss Federal Institute of Technology in Zurich, allows mapping the different ways that climate change will affect different parts of the world. This is the first map to show how global warming combined with natural variations in the climate would affect our planet, highlighting the frequency of extreme climate events—such as heat waves and floods—by 2100 compared with the late 20th century. It is intended to “help policy-makers gain a quick overview of the scientific facts without getting lost in the detail,” says Michèle Bättig, member of the team. (January 2007) Ref.911

New research and models by the National Center for Atmospheric Research and the University of Colorado's National Snow and Ice Data Center found that the Arctic could be seasonally free of sea ice by 2020, 30 years sooner than predicted by the IPCC report. In addition to all the consequences for the ecosystem and the Nordic inhabitants, this might accelerate even more global warming, as reflection of the sun’s heat and light will be strongly diminished. (May 2007) Ref.912

New computer climate models reveal Earth’s limits of CO₂ intake. The computer climate models developed by scientists from Berkeley Atmospheric Sciences Center, Woods Hole Oceanographic Institution, and the National Center for Atmospheric Research (NCAR) in Boulder, Colorado indicate that CO₂ absorption by land and oceans can not keep up with the current trends of increasing fossil fuel emissions, accelerating climate warming after the critical point is reached. The process is increased by drought and other phenomena already present. The paper explaining the findings, *Evolution of carbon sinks in a changing climate* was published in the Proceedings of the National Academy of Sciences (PNAS) of August 9, 2005. Another computer model, also developed by scientists at the National Center for Atmospheric Research, simulates Earth’s climate at the time of the greatest mass extinction in history, at the end of the Permian Era. It reveals that an abrupt and dramatic rise in atmospheric levels of CO₂
triggred the extinction of an estimated 90-95% of all marine species, and about 70% of all terrestrial species. "The results demonstrate how rapidly rising temperatures in the atmosphere can affect ocean circulation, cutting off oxygen to lower depths and extinguishing most life," says NCAR scientist and lead author, Jeffrey Kiehl. (August 2005) Ref. 913

Results of state-of-the-art climate models by Lawrence Livermore National Laboratory are consistent with new observational estimates of temperature data obtained from satellites and weather balloons, providing compelling evidence that the tropical troposphere is warming since 1979. Human activity is considered as one important cause of the warming. [See also New Developments on Climate Change of January 2005 environmental security report.] (August 2005) Ref. 914
C. Protecting the Environment Due to Its Inherent Moral Value

WWF and the Global Footprint Network report that humanity’s impact on the planet has more than tripled since 1961 and that Earth’s resources are being used faster than they can be replaced by nature. If present trends continue, by 2050 humanity will demand twice as much as the planet can supply. The Millennium Ecosystem Assessment reported that 60% of Earth’s vital ecosystem services are being degraded or used unsustainably.

There are more than 700 MEAs. The focus of international negotiations is switching from designing new treaties to reinforcing existing ones and strengthening international environmental governance. Evaluation mechanisms of the effectiveness of these agreements are improving. Nevertheless, noncompliance with international treaties and lack of cooperation with international organs, as well as deadlock in many international treaty–related negotiations, continue to be an international concern.

The 2007 UNEP Governing Council adopted decisions on issues related to strengthening international environmental governance (including the draft Environment Watch Strategy Vision 2020 and coordination and synergies among multilateral environmental agreements) and improving the assessment of the world environmental situation and mitigation actions.

ENVIRONMENTAL SECURITY-RELATED INTERNATIONAL REGULATIONS THAT HAVE BEEN COMING INTO FORCE SINCE AUGUST 2002

Access to Information and Liability

Rotterdam Convention on the Prior Informed Consent (PIC)

Rotterdam Convention (PIC) entered into force on February 24, 2004
The Rotterdam Convention on the Prior Informed Consent (PIC) stipulates that export of a chemical covered by the Convention can take place only with the prior informed consent of the importing country and requires labeling and information on potential health and environmental effects; entered into force on February 24, 2004. (February 2004) Ref916

Protocol on Strategic Environmental Assessment (SEA)

Protocol to the UNECE Convention on Environmental Impact Assessment in a Transboundary Context
The SEA is a Protocol to the Convention on Environmental Impact Assessment in a Transboundary Context that will require its parties to include public participation in environmental impact analysis of all major projects prior to implementation, and requires that a response be given to that public participation. The protocol will enter into force when 16 signatories ratify (May 2003). Ref.917

Meeting of parties to the Convention held 1-4 June 2004
Meeting of the signatories to the SEA protocol was held 1-4th June 2004 in Cavtat (Croatia). At
the time of this writing, the final documents were not yet available. Updates will be available on UNECE website at: http://www.unece.org/env/eia/cavtat.htm

**Aarhus Convention on Access to Information Public Participation in Decisionmaking and Access to Justice in Environmental Matters.**

*Full Application of the Aarhus Convention*

On 22 October 2003, the European Commission put forward three new legislative proposals towards a full application of the Aarhus Convention. These proposals cover those aspects of the Convention that were not dealt with earlier: 1) directive on access to justice on environmental matters; 2) regulation on the application of the Aarhus principles to the EU institutions and bodies; and 3) decision on conclusion by the EU of the Aarhus Convention, which would allow the EU to ratify the convention. The Aarhus Convention deals with access to information, public participation in decision-making and access to justice in environmental matters in order to implement its provisions into EU law. (October 2003) Ref.918

*Network of Environment Centres in Central Asia*

The resolution adopted at the third regional seminar on the implementation of the Aarhus Convention in Central Asia calls for the set up of a new network of Aarhus Resource centers in five Central Asian states. The centers will raise environmental awareness and provide the general public with access to information. The network will improve the mechanism for implementing the Convention and help governments and civil society in the region to collaborate on decisions regarding environmental policy. (February 2004) Ref.919

**European Environmental Liability Directive Came Into Force**

The Environmental Liability Directive establishes a comprehensive framework on liability for damage to the environment, based on the “polluter pays” principle. It aims to ensure that the financial liability for environmental damage prevention or remediation falls on the polluters who caused it, rather than on the taxpayers. Operators are financially responsible for ensuring that they have preventive or remedial measures. When the environmental situation involves more than one member state, then they must cooperate on the necessary preventive or remedial actions. The Directive was adopted in April 2004 and member states were supposed to bring into force the appropriate laws and regulations by April 30, 2007. [See also European Union Polluter Pays Law] (April 2007) Ref. 920

**EU Polluter Pays Bill**

The final draft, approved by the European Parliament on March 31, 2004 would hold Member States responsible for ensuring that environmental damage is either prevented by taking appropriate measures or effectively remedied by restoring the previous situation if damage has already been done. (April and February 2004) Ref. 921

**Air Pollution**

**Geneva Convention, Protocol on Persistent Organic Pollutants (POPs)**

*Geneva Convention on Long-range Transboundary Air Pollution, Protocol on Persistent Organic Pollutants (POPs) entered into force on October 23*
The Protocol on Persistent Organic Pollutants (POPs), the sixth protocol to take effect under the Geneva Convention on Long-range Transboundary Air Pollution of the U. N. Economic Commission for Europe (UNECE), has the ultimate goal of eliminating any discharges, emissions and losses of 16 POPs; entered into force in October 2003. (August-September 2003) Ref. 923

**Gothenburg Protocol on Air Pollution Entered into Force in May 2005**

The Protocol to Abate Acidification, Eutrophication and Ground-level Ozone entered into force on 17 May 2005. The Protocol was originally adopted on 30 November 1999 in Gothenburg (Sweden) and signed by 31 countries. It is the eighth to take effect under the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe (UNECE). The Protocol sets targets for emission cuts for sulphur dioxide, nitrogen oxides, volatile organic compounds (VOCs), and ammonia, and sets limit values for specific emission sources (e.g. combustion plants, electricity production, dry cleaning, cars and lorries) and requires best available techniques to be used to keep emissions down. (May 2005)

*Changes to Gothenburg Protocol— the Convention on Long-range Transboundary Air Pollution*

U.S. ratification brought the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to just two ratifications away from its entry into force. This eighth Protocol to the Convention on Long-range Transboundary Air Pollution (LRTAP) of the United Nations Economic Commission for Europe (UNECE) sets emission ceilings for 2010 for four pollutants: sulphur, NOx, VOCs, and ammonia, regulating emissions by sources (e.g. combustion plant, electricity production, dry cleaning, cars and trucks), and requiring the use of best available techniques to keep emissions down. In the meantime, an expert group is conducting work on fine particles; the results might lead to either amendment of the Gothenburg Protocol or a new protocol specifically on fine particles.

Two new persistent organic pollutants (POPs) may be considered for addition to the Protocol on POPs, pentabromodiphenyl ether (PBDE) and perfluorooctane sulphonate (PFOS).

As the 1979 Convention presently covers just Europe, the U.S., and Canada, efforts will increase to extend it towards the east, involving East European, Caucasian and Central Asian countries. (December 2004) Ref. 924

**EU New Directive on Air Pollution**

A new air quality directive approved by the Environment Council is fixing an annual concentration limit for fine dust particles (known as PM2.5) to 25 micrograms per cubic meter averaged over a year, with effect from 1 January 2015 and will require Member States to reduce people's exposure to this group of particles by 20% between 2010 and 2019. The new directive would not change existing air quality standards for other pollutants but would give Member States more flexibility in meeting some of these in zones where they face difficulties. [See also EU Thematic Strategy on Air Pollution for the CAFE Programme in September 2005, and The European Union Environmental Initiatives in January 2005 environmental security reports.]

(October 2006) Ref. 925

**EU Airline Carbon Trading to Start in 2011—a Year Earlier than Planned**

The European Parliament's Environment Committee voted to include aviation in Europe's emissions trading scheme from 2011—a year earlier than planned. Airlines should bid for at least
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25% of pollution permits. Members of the European Parliament want to set CO₂ emissions cap at 90% of the levels between 2004 and 2006 rather than 100%, with the cap lowered in subsequent years from 2013. [See also New European Environmental Regulations in December 2007 and Europe to Propose Emissions Targets for All Flights to/from or within Europe in November 2006 environmental security reports.] (May 2008) Ref.926

Provisional Agreement for Including Aviation in the Emission Trading Scheme from 2012

The EU lawmakers reached agreement with Member States to include aviation in the greenhouse gas emissions trading scheme from 2012. The airlines will have to cut emissions by 3% in the first year, and by 5% from 2013 onwards, paying for 15% of their permits to pollute. Presently, aviation generates an estimated 3% of EU CO₂ emissions, but air traffic is expected to double by 2020. [See also EU Airline Carbon Trading to Start in 2011—a Year Earlier than Planned in May 2008 and other similar items in previous environmental security reports.] (June 2008) Ref.927

ASEAN Agreement on Transboundary Haze Pollution

ASEAN Haze Agreement to Enter into Force 25 November, 2003

The ASEAN Agreement on Transboundary Haze Pollution will enter into force on 25 November, 2003. This follows the deposit of the sixth instrument of ratification by the Government of Thailand with the Secretary General of ASEAN on 26 September, 2003. This agreement is the first such regional arrangement in the world that binds a group of contiguous states to tackle transboundary haze pollution resulting from land and forest fires. The Agreement contains provisions on monitoring, assessment and prevention, technical cooperation and scientific research, mechanisms for coordination, lines of communication, and simplified customs and immigration procedures for disaster relief. The Agreement provides for the establishment of an ASEAN Coordinating Centre for Transboundary Haze Pollution Control to undertake the various activities required under the Agreement. (September 2003) Ref.928

Indonesia urged to quickly ratify ASEAN Agreement on Trans-boundary Pollution

INDONESIA advised others not to assign blame to it for the recurring haze while Malaysia urged the nation to quickly ratify the ASEAN Agreement on Trans-boundary Pollution to help arrest the problem. (June 2004) Ref.929

Europe to Reduce Fluorinated Gas Emissions

In August 2003 the European Commission adopted a proposal to regulate emissions of fluorinated greenhouse gases (F-gases) used in refrigeration and air conditioning systems. The main elements of the proposal are provisions to improve the containment of these gases, better reporting, specific restrictions on marketing and use of F-gases in certain applications, and a phase-out of HFC-134a in car air conditioning systems (March 2004) Ref. 930

EU Committee Proposes Banning Fluorinated Gases

The European Parliament has voted to ban the use of fluorinated gases (F-gases) in certain products, including shoes, and car air conditioning systems. This is a much watered-down regulation compared to previous plans. The committee proposes to regulate the F-gases on an environmental basis and not on an internal market basis, which avoids countries having to adopt environmental standards higher than those of the EU's, thereby making themselves subject to trade sanctions. [See also EU Environment Ministers Propose post-Kyoto Protocol Climate...
European Parliament Passed the Fine Particles Air Quality Directive
The European Parliament approved the text of a new directive on ambient air quality and cleaner air for Europe. The new legislation replaces and updates five existing laws and for the first time sets binding standards and target dates for fine particles PM2.5 (particulate matter that is 2.5 micrometers or smaller in size). EU States will have to reduce exposure levels in their urban areas to PM2.5 by an average of 20% by 2020 compared to 2010 levels, and bring them below 20 micrograms/m3 by 2015, while keeping the 25 micrograms/m3 levels throughout their countries. Member States will have two years to adopt the necessary national laws after the directive’s entry into force. [See also EU New Directive on Air Pollution in October 2006 environmental security report.] (December 2007) Ref.932

Aquatic Environment

Freshwater

EU to Introduce New Regulations to Combat Surface Waters Pollution
The European Commission has proposed new rules regulating the amount of chemicals and toxic substances seeping into the continent's surface waters. The new regulation will apply to the 25-nation bloc, and would set new limits on the concentration levels of 41 hazardous chemicals in rivers, lakes and coastal waters. The directive, if approved by member states and the European Parliament, would require EU nations to "achieve the proposed limits for all priority substances by 2015 and cease discharges and emission of priority hazardous substances into water by 2025," says the Commission statement. (July 2006) Ref.935

European Parliament Approves New Water Quality Standards Directive
The European Parliament approved the new directive on water environmental quality standards to harmonize quality standards across the EU and thereby better protect surface waters (rivers, lakes and coastal waters) against pollution from a range of 33 priority chemicals. The new directive is the final major piece of legislation in the Water Framework Directive and replaces five existing directives, simplifying water-related reporting within the newly created Water Information System for Europe. Member States have until December 2009 to comply. [See also EU to Introduce New Regulations to Combat Surface Waters Pollution in July 2006 environmental security report.] (June 2008) Ref.936

Protocol on Shared Watercourse Systems
Indian Water Diversion from 37 Himalayan rivers to be completed by 2016 affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water. India has been planning to divert water from 37 Himalayan rivers to drier areas of the country. A report on this irrigation scheme is due by 2006, with construction to commence shortly thereafter and be completed by 2016. However, diversion of these rivers affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water. Flooding
during the monsoon season is likely to increase as a result of this diversion. Salinity would affect agricultural lands. The mangrove forests of the Bangladeshi deltas, which are a World Heritage site, would suffer from the lack of fresh water influx. Bangladesh is protesting through diplomatic channels. About 40% of humanity lives in the 260 major international water basins shared by two or more countries; hence, one can expect an increasing need for bi- and multi-lateral treaties to prevent conflict. (August-September 2003) Ref.937

**Marine Environment**

**UN General Assembly adopts Resolutions on Marine Protection**
The UN General Assembly concluded its debate on oceans and the law of the sea by adopting three resolutions: one entitled “Oceans and the Law of the Sea” (resolution A/57/L.48/Rev.1) on compliance of shipping vessels with conservation measures; and the other two on protecting the marine environment and harmful fishing practices. The Assembly also decided to establish a UN process for global reporting and monitoring of the marine environment by 2004. The Secretary-General would be invited to establish an effective, transparent and regular inter-agency coordination mechanism on oceans and coastal issues within the UN. (December 2002) Ref.: 939

**IMO Sets New Limits on Ship Fuel Pollution**
The International Maritime Organization has agreed on severe new limits on ship fuel pollutants, especially sulphur (sulfur). The restrictions are to be implemented by 2015, and will impose a change in sulphur limits in special Sulphur Emission Control Areas (SECA) to 0.1% from the current 1.5%. The set of SECAs, now including only Baltic and North Sea areas, is likely to be expanded to other coastal regions in the world. (May 2008) Ref.940

**Tougher Global Limits Imposed on Air Pollution from Large Ships**
The Marine Environment Protection Committee (MEPC) of the IMO adopted regulations to reduce harmful air emissions from large ships. The revised MARPOL Annex VI Regulations for the Prevention of Air Pollution from Ships sets progressive reduction in emissions of sulphur oxide (SOx), nitrogen oxide (NOx), and particulate matter from ships. By 2020, ships will be required to use fuel with no more than 5,000 ppm sulfur, a 90% reduction from today’s global cap. The revised Annex VI, and the associated NOx Technical Code, will enter into force on July 1st, 2010, under the tacit acceptance amendment procedure. MARPOL Annex VI entered into force in May 2005 and has, so far, been ratified by 53 countries, representing 82 % of the gross tonnage of the world’s merchant shipping fleet. [See also Concerns over Maritime Air Pollution Increase in February 2008 environmental security report.] (October 2008) Ref.941

**IMO Adopts New Convention on Ships' Ballast Water**
The International Convention for the Control and Management of Ships' Ballast Water and Sediments adopted by the International Maritime Organization (IMO) aims “to prevent the potentially devastating effects of the spread of harmful aquatic organisms carried by ships' ballast water.” The Convention will enter into force 12 months after ratification by 30 States, representing 35% of world merchant shipping tonnage. (February 2004) Ref. 942

Ratification began for the International Convention for the Control and Management of Ships'
Ballast Water and Sediments
Australia is the first country to sign the international agreement regulating ships’ ballast water, adopted in February 2004 by the UN International Maritime Organization (IMO), and began the ratification procedures. The International Convention for the Control and Management of Ships’ Ballast Water and Sediments stipulates a series of measures aiming to prevent potential marine hazards caused by aquatic organisms carried by ships’ ballast water. It will come into force 12 months after ratification by 30 countries, representing 35% of world merchant shipping tonnage. [See also IMO Adopts New Convention on Ships’ Ballast Water in the February 2004 environmental security monthly scanning report.] (June 2005) Ref. 943

European Directive on Ship-Source Pollution Became Effective on April 1, 2007
Directive 2005/35 on ship-source pollution and the introduction of penalties for infringements became effective April 1, 2007 across all 27 EU member states. The Directive introduces application of criminal penalties for gross negligence or illegal discharges of polluting substances at sea. It came into force in October 1, 2005 with implementation on March 1, 2007, and the EU member states were obligated to incorporate it into their national laws by March 31, 2007. Note: by 2011, the International Maritime Organization will require all ships to be equipped with a voyage data recorder, similar to the black box on an aircraft. This will greatly help the new directive’s enforcement. [See also Political Agreement Reached on the European Marine Strategy Directive, Europe to Harmonize Marine Pollution Legislation, and International Maritime Organization (IMO) wants global rather than many different local or regional rules] (April 2007) Ref. 944

The Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter entered into force on March 24, 2006
The 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) entered into force on March 24, 2006. The Protocol is a comprehensive and restrictive set of regulations regarding dumping of wastes at sea. The new rules prohibit dumping of any materials except for those on an approved list. The 1972 Convention permitted dumping of wastes at sea, except for those materials on a banned list. This is the first international maritime treaty regulating storage of wastes in the seabed, as well as the abandonment or toppling of offshore installations, and it includes the “polluter pays” principle. Although the Protocol’s dumping provisions do not cover internal waters, Parties to the Protocol have the option to apply its rules to their internal waters if they wish (Article 7). The Protocol also has linkages with other international environmental agreements that have been developed since 1972; for instance, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The U.S. is a Party to the 1997 London Convention, but is not a Contracting Party to the 1996 Protocol. (March 2006) Ref. 945

EU Integrated Maritime Policy
The European Commission has adopted an Integrated Maritime Policy for the EU. The new policy will build on Europe’s strengths in marine research, technology, and innovation, as well as space technology, for ensuring maximum environmental sustainability. [See also Political Agreement Reached on the European Marine Strategy Directive in December 2006, Europe to Harmonize Marine Pollution Legislation in July 2005, and International Maritime Organization wants global rather than many different local or regional rules of January 2003 environmental
European Parliament Passed the Marine Strategy Directive
The European Parliament approved the text of the Marine Strategy Directive that calls for the establishment of marine regions and sub-regions to be managed by Member States on a coherent and coordinated ecosystem-based approach and for ensuring that the marine strategies affecting the regions are coherent and coordinated. Member States are to assess the status of their region’s marine environment, set objectives, and establish targets and programs by 2015 to attain good environmental status by 2020 and establishment of marine protected areas. [See also Political Agreement Reached on the European Marine Strategy Directive in December 2006 and other similar items in previous environmental security reports.] (December 2007) Ref. 947

EU Waste Shipment Legislation Came into Force in July 2007
The EU legislation on transboundary shipments of waste adopted in 2006 came into effect July 12, 2007. The regulation establishes a legal framework to ensure that waste is properly handled from the time it is shipped to the time it is disposed of or recovered at destination, and bans the export and/or disposal of hazardous waste to certain countries. The new law replaces the 1993 waste shipment regulation, stipulating a more clear and simplified framework, as well as more severe enforcement measures. [See also EU to Increase Environmental Regulations Enforcement in December 2006, Toxic Waste Disposal of Global Growing Concern in September 2006, and other related items in previous environmental security reports.] (July 2007) Ref. 948

Anti-Fouling Systems on Ships Convention to Enter into Force in September 2008
The International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS Convention) will enter into force on September 17, 2008 (12 months after fulfilling the criteria for entry-into-force.) The AFS Convention bans the use of organotin compounds on ships’ hulls or external surfaces, requires the application of an isolating coating for ships already carrying such compounds, and establishes a mechanism to assess other anti-fouling systems to prevent the use of potentially harmful substances in these systems. The Convention will apply to all ships and floating units operating under the flag of a Party to the Convention and/or entering the port, shipyard, or offshore terminal of a Party. (September 2007) Ref. 949

Single-hull Oil Tanker Phase-out Entered into Force

Proposals to the EU to cut sulfur emissions from ships
The European Union released a legislative proposal intended to reduce ships' sulfur emissions, going beyond the global maritime norms. The high sulfur fuel used by ships is responsible for sulfur dioxide emissions that contribute to acid rain, which can pollute waterways and damage forests and crops. Although the shipping industry is contesting the proposal as contravening the International Law of the Sea, the green groups consider that the targets to cut ship sulfur
emissions should be as high as 80% by 2010. So far the EU is only willing to look at cuts around 10%. (February 2003) Ref.: 952

**Oil Spill Fines Increase—effective March 2005**

Oil pollution damage compensation under the 1992 Civil Liability Convention will be substantially enhanced with the entry into force of the Supplementary Fund for Compensation for Oil Pollution Damage at the beginning of March 2005. Under the new Protocol, payments for an oil spill will be raised and capped at 750 million Special Drawing Rights (about $1.152 billion). Meantime, the EU agreed on stronger measures against ships polluting European waters. Each EU country would be allowed to charge a minimum penalty for marine pollution. The fines are between 150,000 and 300,000 euros (about $398,500) for less serious cases, and between 750,000 and 1.5 million euros for more serious cases, although member states may set higher fines if they want. The new rule is pending approval by the European Parliament. The EU ambassadors will also seek agreement for proposing that ships’ captains' personal liability be included in international maritime conventions. (December 2004) Ref. 953

**Political Agreement Reached on the European Marine Strategy Directive**

The European Environment Council reached political agreement on the framework directive for EU action on marine environment policy. The Marine Strategy Directive aims to ensure that all EU marine waters are environmentally healthy by 2021 and it is the main component of the Thematic Strategy on the Protection and Conservation of the Marine Environment, which was adopted in October 2005. The Strategy is based on regional assessment of the marine situation, exchange of information, and design of policies to improve ecosystem conservation or rehabilitation, as well as pollution reduction and clean-up. [See also New EU Environmental Strategies in September 2005, Europe to Harmonize Marine Pollution Legislation in July 2005, The European Union Environmental Initiatives in January 2005, and International Maritime Organization (IMO) wants global rather than many different local or regional rules of January 2003 environmental security monthly reports.] (December 2006) Ref. 954

**European Parliament Resolution to Protect Whales From Sonar**

The European Parliament has passed a resolution calling on its 25 member states to halt the deployment of high-intensity active naval sonars until a global assessment of their cumulative environmental impact on marine mammals, fish and other marine life has been completed. The resolution also asks the European Commission to conduct an assessment study of current practices and their impact in European waters. The issue is expected to be on the agenda of two upcoming events: the second meeting of the Parties to a European regional cetacean conservation treaty November 9 to 12 that will vote on a resolution on the harmful effects of military sonar on marine life, and the final stakeholders meeting on the EU Marine Strategy, November 10-12. [See also items Research Confirms Military and Industry Sonar Harms Whales, and US military waived in respecting environmental law under ‘Other New Technologies Potential Implications’ further in this report.] (October 2004) Ref. 955

**Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)**

Delegates to the IWC meeting adopted a resolution to keep the moratorium banning commercial whaling in effect, despite Japan’s lobbying for its suspension. Conservation organizations and anti-whaling countries argue that Japan’s lethal “scientific research on whales,” violates
international regulations for whales’ protection. Japan threatens to leave the IWC and form another organization to deal with regulations on whale-related issues. (June 2007) Ref.956

**Shipwrecks Removal Treaty Received First Signature**
The Nairobi International Convention on the Removal of Wrecks adopted in May 2007 provides an international legal framework to deal with shipwrecks presenting possible safety and/or environmental hazards. According to the International Maritime Organization, the number of abandoned shipwrecks worldwide is estimated to be 1,300, and the threat they represent has been increasing. The convention provides the legal basis for States to remove the wrecks, or have them removed, and have the registered owner liable for costs incurred. The Convention is open for signature until November 18, 2008, thereafter being open for ratification, accession or acceptance; it will enter into force 12 months after the date it receives ten ratifications (or accessions or acceptances). (March 2008) Ref.957

**South-west Pacific Islands Might “Localize” environment-protection legislation**
In contrast to the preceding item, in the southwestern Pacific ecosystem-based management of coastal areas might become very much decentralized. "The island nations of the south-western Pacific are considering allowing citizens to reclaim legal control of their local seas, in the hope they can use their traditional knowledge, customs and laws to protect fish stocks and biodiversity,” says a *New Scientist* article. In this plan, villages will own the seas immediately adjacent to them, and can set up environment-protecting restrictions for them, with the legal backing of the central government. (April 2004) Ref.958

**Marine Protection to Increase**
The International Whaling Commission 2008 Scientific Committee report reveals alarming results that the number of ocean dead zones has grown to 400, from only 44 areas reported in 1995. UNEP says that man-made activities such as use of fertilizers, and sewage and other pollutants, combined with the impact of climate change, have led to the doubling of the number of oxygen-deficient dead zones every decade since the 1960s. Meantime, New Zealand put forward a new Exclusive Economic Zone Environmental Effects Bill, expected to be introduced by late August, which will apply to environmental effects of currently unregulated activities in the EEZ. [See also *International Conference and Assessments Find Rising Ocean Pollution* in October 2006 and other similar items in previous environmental security reports.] (June 2008) Ref.959

**Maritime Protected Areas**

UN Convention on the Protection of the Underwater Cultural Heritage will Enter into Force in January 2009
The Convention on the Protection of the Underwater Cultural Heritage will enter into force on January 2, 2009, three months after 20 States ratified it. “This represents an essential addition to UNESCO’s standard-setting apparatus” declared Koichiro Matsuura, Director-General of UNESCO. The Convention aims to curb the destruction of underwater cultural heritage and its Annex details the rules for activities directed at underwater sites. (October 2008) Ref.960
New Marine Protected Areas Proposed
New proposals aim to protect critical marine ecosystems and whale and dolphin habitats in several Mediterranean Sea areas and the Black Sea from excessive fishing, intense shipping traffic, and maritime pollution. The proposed areas include (see map in the Appendix): the entire Alborán Sea and Straits of Gibraltar; the Strait of Sicily; the Amvrakikos Gulf (NW Greece); two Black Sea areas; and seven other Mediterranean areas—5 in Greece, 2 in Italy. The proposals will be put forward to the 20-country parties Agreement on the Conservation of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) by its Scientific Committee at the Meeting of the Parties to be held in Croatia, in October. Meanwhile, the Spanish Navy has asked ships to slow to 15 knots and sail "in a maximum state of vigilance" to avoid colliding with whales in the Strait of Gibraltar. [Note: The state of World Fisheries and Aquaculture 2006 report released this month by FAO warns that several species of fish in high seas outside of national jurisdictions are in danger.]
The World Wildlife Fund (WWF) launched a campaign for creating a network of conservation areas in the Southern Ocean by 2012, to protect it against unsustainable fishing, marine pollution, and effects of climate change. WWF will put forward the Southern Ocean protection proposal at the next Antarctic Treaty Consultative meeting, to be held from 30 April to 11 May 2007 in New Delhi, India. [Note: see itemWebsite for Marine Protected Areas and Cetacean’s Sanctuaries further in this report] (March 2007) Ref. 961

Roadmap for Establishing the Global System of Marine Protected Areas
Establishing a Marine Protected Areas network by the year 2012 was proposed at the First International Marine Protected Areas Congress held in October 2005. Establishing Networks of Marine Protected Areas – Making It Happen is a roadmap for helping to meet that goal. Launched at the World Conservation Union (IUCN) Marine Protected Area Summit in Washington, DC, April 11, 2007, it was published by the National Oceanic and Atmospheric Administration, in collaboration with the IUCN World Commission on Protected Areas, the Great Barrier Reef Marine Park Authority, the World Wildlife Fund–Australia, and The Nature Conservancy. [See also Network of Marine Protection Areas to be Adopted by 2012, Marine Environment Needs More Protection, Stronger Regulations to Protect Ocean Marine Environments.] (April 2007) Ref.962

New Pacific Marine Protected Area Is World’s Largest
Kiribati has established the Phoenix Islands Protected Area, covering 410,500 square kilometers in the central Pacific. A representative of the New England Aquarium, which is advising the Kiribati government, stated, “The new boundary includes extensive seamount and deep-sea habitat, tuna spawning grounds and as yet un-surveyed submerged reef systems.” (February 2008) Ref.963

Mandatory Area to be Avoided in New Zealand—established by IMO
The New Zealand Maritime Safety Authority has successfully petitioned the International Maritime Organization (IMO) to have the area around the Poor Knights Islands designated as a “Mandatory Area to be Avoided” (MAA). The Poor Knights area became the first place on the planet to be protected by the new IMO classification, which was created to protect ecologically fragile areas. As a consequence, ships longer than 45 meters (148 feet) must stay at least 5.5 miles (8.8 kilometers) east of the Poor Knights, starting December 1, 2004. (May 2004) Ref. 964
Stronger Guidelines for UN Fish Stocks Agreement
Delegates attending a preparatory meeting for the review of the UN Agreement for Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, agreed on guidelines to strengthen the treaty in order to better manage the world’s fish stocks. The guidelines will serve to: evaluate the adequacy and implementation status of the Agreement, assess what new political commitments are needed, establish new regional management organizations, and strengthen international cooperation. The “Fish Agreement” entered into force in December 2001; the review conference will be held in New York, May 22–26, 2006. (March 2006) Ref. 965

IMO establishes first “Mandatory Area to be Avoided” in New Zealand
The New Zealand Maritime Safety Authority has successfully petitioned the International Maritime Organization (IMO) to have the area around the Poor Knights Islands designated as a “Mandatory Area to be Avoided” (MAA). The Poor Knights area became the first place on the planet to be protected by the new IMO classification, which was created to protect ecologically fragile areas. As a consequence, ships longer than 45 meters (148 feet) must stay at least 5.5 miles (8.8 kilometers) east of the Poor Knights starting December 1, 2004. (May 2004) Ref.966

French Creates 90-mile Mediterranean Ecological Zone
The French National Assembly has approved a law creating a 90-mile ecological zone to protect the country’s Mediterranean coastline, with the primary objective of stopping ships from dumping dirty ballast water in the designated zone. Offenders face fines up to $600,000 and up to four years in jail.

The law was approved just days after the European Union agreed to ban single-hull oil tankers from its ports. The ban will enter into force once the European Parliament approves it. Single-hull oil tankers older than 23 years would be immediately banned from the EU, while more modern ones would be phased out in stages up to 2015. The EU is pushing for the ban to be adopted by the International Maritime Organization (IMO) by the end of the year. (April 2003) Ref.: 967

Micronesian Nations Sign Coral Reef Protection Document
The presidents of Palau, Micronesia, and the Marshall Islands became the first heads of state to sign the International Declaration of Reef Rights, created by the Reef Check Foundation to raise awareness about the value of coral reefs and how to protect them. 2008 is the International Year of the Reef. (September 2007) Ref.968

Coral Triangle May Get Regional Protection
The six Asian countries (Indonesia, Malaysia, the Philippines, Papua New Guinea, the Solomon Islands and East Timor) that border the “Coral Triangle” have been discussing measures for additional safeguarding of that fragile region against pollution and other hazards. The US has pledged nearly $40 million to support these efforts. (October 2008) Ref.969

Biological Diversity and Safety
Cartagena Protocol on Biosafety

The First Meeting of the Conference of the Parties to the Cartagena Protocol on Biosafety
The first meeting of the Parties (COP MOP 1) adopted procedures and mechanisms to implement and promote compliance with the Protocol aiming to protect biological diversity from the potential risks that may be posed by living modified organisms (LMOs), commonly referred to as genetically modified organisms (GMOs). (February 2004) Ref.971

Cartagena Protocol on Biosafety Enters Into Force
The Cartagena Protocol on Biosafety requires exporters to provide the importer complete relevant information and documentation pertaining to genetically modified organisms; entered into force in September 2003. (August-September 2003) Ref972

The EU Executive Commission also adopted new legislation that requires each variety of genetically modified organisms used in food and animal feed to be assigned a unique code so products containing these GMOs can be accurately labeled and traced when they get on the market. (January 2004) Ref 973

Convention on Biological Diversity and the Cartagena Protocol
The third Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP-3) was held from 13-17 March 2006, in Curitiba, Brazil, preceding the eighth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP-8) held 20–31 March.

COP/MOP-3 adopted 18 decisions ranging from requirements for handling, transport, packaging and identification of living modified organisms (LMOs) to capacity building and funding. The most important achievement was the adoption of the documentation requirements for LMO shipments for food, feed and processing (LMO-FFPs).

The Conference of the Parties to the Convention on Biological Diversity (CBD COP-8) focused on concrete actions and policies to achieve the 2010 biodiversity target. Global Biodiversity Outlook 2, by the secretariat of the UN CBD, released at the opening of the Conference, reveals that human activity might be the cause of the worst extinction since the dinosaurs’ era. Some notable outcomes of the CBD COP-8 include:

- call to use zoning schemes, special management areas, and policies to preserve endangered species
- designation of several new protected areas
- rejection of lifting the moratorium on terminator seeds
- set of measures and objectives for the protection and sustainable use of the vulnerable biodiversity of islands, and another on arid lands
- new initiatives to raise awareness globally on the consequences of the biodiversity loss
- an alliance among the world’s top research centers and agencies specializing in biodiversity to cooperate with the UN CBD to reduce the rate of loss of biodiversity by 2010
- Conservation of Biodiversity Rich Sacred Natural Sites initiative
- a 2010 Biodiversity Forum with preparations to begin this year

The ninth Conference of Parties will be held in 2008, in Germany. The Convention on Biological Diversity has 188 Parties (168 Signatures), and the Cartagena Protocol on Biosafety has 132 Parties (103 Signatures). The United States is not Party to any of them. (March 2006) Ref. 974
UN Convention on Biological Diversity 7th Conference of the Parties (COP 7) reaffirmed governments' engagement to establish a worldwide network of protected areas by setting rigorous targets to reduce loss of biological diversity

UN Convention on Biological Diversity 7th Conference of the Parties (COP 7) held in Kuala Lumpur, 9-20 February 2004 and attended by some 2,000 participants, including 80 ministers, reaffirmed governments' engagement to establish a worldwide network of protected areas (on land by 2010 and in the world's oceans by 2012 including parts of the high seas, which fall outside national jurisdictions), by setting rigorous targets to reduce loss of biological diversity. The delegates decided to adopt a more quantitative approach to help monitor the extinction rates and meet the targets and sub-targets. Using measurable indicators, governments will be able to more accurately measure progress or regress on the set-up targets.

The proposal was formulated at the January 2004 meeting in Madrid by environmental officials from Europe, Russia, and Central Asia. COP 8 will be held in Brazil in 2006. (January and February 2004) Ref.975

New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties

The focus of the fourth Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP 4), held from 12-16 May 2008 in Bonn, Germany, was on enforcement measures. It adopted 18 decisions on issues related to: the Biosafety Clearing-House; identification and handling of living modified organisms; notification requirements; risk assessment and risk management; and monitoring and reporting. The timetable and framework were set for a liability and redress regime concerning potential damage caused by the movements of genetically modified organisms, which will be further discussed at the next meeting of the parties to take place in October 2010, in Nagoya, Japan. An ad hoc technical expert group was mandated to consider risk assessment and risk management issues. The Rules, Procedures and Mechanisms Applicable to Processes under the Cartagena Protocol on Biosafety was also published at this meeting. The Ninth Meeting of the Parties to the Convention on Biological Diversity followed, May 19-30, 2008, also in Bonn, Germany, assessing mechanisms to reduce loss of biodiversity. The CBD COP 9 adopted the “Bonn roadmap” that addresses issues concerning an international regime on access and benefit-sharing; a mechanism for assessing marine areas in need of protection; a resolution on biodiversity and climate change, including language cautioning against ocean fertilization; and an agreement on biofuels. [See also International Biodiversity Meetings Make Decisions and Tougher Systems to Control GMO Suggested in March 2006 environmental security report.] (May 2008) Ref.976

Plant Genetic Resources for Food and Agriculture—FAO International Treaty—Entered into Force in June 2004

The FAO's International Treaty on Plant Genetic Resources for Food and Agriculture entered into force on 29 June 2004. Countries can now share breeding material from several countries without the need for bilateral agreements for each country. An international fund will be established by payments from those who commercialize plants bred with material from the Multilateral System created by the treaty. The fund will be used to help developing countries improve general conservation, sustainable use of plant genetic resources, and gene bank conservation. It is expected to increase agricultural genetic diversity, which has been reduced considerably; and hence, play a crucial role in the conservation and sustainable use of plant
genetic resources increasing food security. (June 2004) Ref. 977

**Intensified Efforts Needed to Save Biodiversity**
The International Conference on Biodiversity, Science and Governance hosted by UNESCO in Paris, 24-28 January 2005, concluded that strong science and effective governance mechanisms, strategies, and concrete actions to curb the current trend of biodiversity loss are needed by the 2010 target date set at the 2001 World Summit on Sustainable Development. With more than 7,000 animal species and 60,000 plant species threatened, some scientists estimate that the current rate of extinction is a thousand times greater than at any other time in the course of human history. Biological diversity is the basis of environmental viability for all life support. (January 2005) Ref. 978

**Protected Sites and Species**

New Strategy of UNESCO World Heritage Committee for Heritage Sites and Climate Change
UNESCO’s World Heritage Committee is registering protected sites threatened by climate change. These sites will be monitored and actions will be suggested to prevent their damage from climate change. A policy document on the impact of climate change on World Heritage properties will be presented to the World Heritage Committee in 2007. Created in 1972, UNESCO's World Heritage List covers 812 sites around the world. Located in 137 countries, 628 of the World Heritage sites are cultural, 160 are natural and 24 are mixed. [See also New Protected Ecological Sites in July 2005, Nine New Hotspots Added to World's Protected Areas in February 2005, Intensified Efforts Needed to Save Biodiversity in January 2005, and related items on UNESCO World Heritage Sites in November and June 2004, and October 2003 environmental security monthly reports.] (July 2006) Ref. 486

UNESCO Added 23 New Reserve Sites in 18 Countries
UNESCO added 23 new sites in 18 countries to the World Network of Biosphere Reserves that are managed on sustainable development principles to reduce biodiversity loss. Three countries join the global network—El Salvador, Qatar, and the United Arab Emirates. The new additions include 2 sites in each: Argentina, Canada, China, El Salvador, and Portugal, and 1 site in each: Australia, Chile, Costa Rica, Ecuador, Lebanon, Mexico, Federated States of Micronesia, Mongolia, Qatar, South Africa, Spain, United Arab Emirates, and Viet Nam. UNESCO’s Man and the Biosphere (MAB) network now comprises 529 sites in 105 countries. [See also New Sites Added to World’s Protected Biosphere Reserves in October 2006 and others on the same issue in previous environmental security reports.] (September 2007) Ref.980

New UNESCO World Heritage Sites
The UNESCO World Heritage Committee began its 10-day session on June 28, 2004 in Suzhou, China. It is expected that 48 new sites (33 cultural and 8 natural sites) will be added this year to the list of UNESCO World Heritage. (June 2004) Ref. 981

New Sites Added to World’s Protected Biosphere Reserves
UNESCO added 25 new sites to the UN global network of protected biosphere reserves that are managed on sustainable development principles. The new additions include 18 sites in Mexico,
three in Spain, one trans-boundary site shared between Spain and Morocco, and one in each of
the Russian Federation, Viet Nam, and Malawi. UNESCO’s network Man and the Biosphere (MAB)
Programme now comprises 507 reserves in 102 countries. [See also New Protected Ecological Sites
in July 2005 and other previous environmental security reports.] (October 2006) Ref. 982

**Nineteen new Biosphere Reserves Added to UNESCO’s MAB Network**
The International Coordinating Council of UNESCO’s Man and the Biosphere (MAB)
Programme have added 19 new sites in 13 countries to UNESCO’s World Network of Biosphere
Reserves. The MAB Network now consists of 459 sites in 97 countries. The biosphere reserves
are places recognized for promoting development in the service of both socio-economic
development and biodiversity conservation. (November 2004) Ref. 983

**UN Ecological Reserves Network Adds 22 New Sites**
The World Network of Biosphere Reserves, under the Man and the Biosphere (MAB)
Programme of UNESCO, added 23 ecosystems to its list, for a total of 482 sites in 102 countries.
At these reserves, communities promote sustainable development while also conserving
biodiversity. The community members also contribute to governance, management, research,
education, training and monitoring at the sites.
[See also Nine New Hotspots Added to World's Protected Areas in February 2005, Intensified
Efforts Needed to Save Biodiversity in January 2005, and related items on UNESCO World
Heritage Sites in November and June 2004, and October 2003 environmental security monthly
reports.] (July 2005) Ref. 984

**Nine New Hotspots Added to World’s Protected Areas**
The new report by Conservation International, Hotspots Revisited, the result of a four-year
project by nearly 400 ecologists, reveals nine more crisis areas for biodiversity. The 34 identified
‘hotspots’ harbor half of the world's plant species, three-quarters of the most threatened
mammals, birds, and amphibians, and 42% of land vertebrates. The new website launched by
Conservation International (www.biodiversityhotspots.org) features complete and updated
information on the ‘hotspots’ around the world. (February 2005) Ref. 985

**First species selected to be protected under a NAFTA Commission**
NAFTA’s Commission for Environmental Cooperation (CEC) announced the first three wildlife
species to be safeguarded under a new trinational effort to protect species of common
conservation concern in North America: the leatherback turtle, humpback whale and pink-footed
shearwater (bird). The North American Conservation Action Plans are designed to “establish a
common conservation approach across the continent to reduce threats, share expertise and
provide key information to the public and wildlife officers.” The final action plans for a common
approach among authorities in Mexico, United States, and Canada to protect the three species
will be presented for public comment this fall. (March 2004) Ref. 986

**Europe Declares Thousands of Protected Natural Sites**
The European Commission adopted a list of more than 7,000 nature sites in the Atlantic and
Continental regions of the EU to become part of NATURA 2000, the network of protected sites
with the objective of halting the decline of biodiversity by 2010. (December 2004) Ref. 987
Proposal for a Network of Protected Natural Areas
At the January 2004 meeting in Madrid, environmental officials from Europe, Russia, and Central Asia formulated a common proposal aiming to stop global biodiversity decline by 2010. The proposal considers developing a network of protected natural areas—by 2010 on land and 2012 at sea, including parts of the high seas, which fall outside national jurisdictions. The Proposal was presented at the meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 7) in Kuala Lumpur, Malaysia 9-20 February. (January 2004) Ref.988

New Ecological Network Has Environmental Implications
The National Science Foundation announced the formation of a Design Consortium and Project Office for the National Ecological Observatory Network (NEON), field and lab instrumentation deployed across the United States and integrated via a cutting-edge information network into a continent-wide research platform designed to answer scientific questions at regional and continental scales to enable ecological forecasting. According to an NSF scientist, "It will … [bring] together ecologists, engineers, social, physical, computer, and earth scientists—to investigate ecological phenomena that span large geographical areas and long periods of time." NEON is important because of the significant role of ecological monitoring and evaluation in monitoring the state of the environment as it is protected by domestic law and international agreements. (September 2004) Ref. 989

World Parks Congress adopts Conservation Accord
The Durban Action Plan and Durban Accord adopted at the 5th World Parks Congress in Durban, South Africa stipulates new commitments and policy guidance for protected areas worldwide. Among the 32 specific recommendations are: establishing a global system of protected areas linking surrounding landscapes and seascapes by 2012; and the development of a credible global estimate of funding needs by 2006 to improve the management of the world’s 100,000 protected areas.

Also at the congress, West African countries (Cape Verde, Gambia, Guinea, Guinea-Bissau, Mauritania and Senegal, as well as 50 organizations) announced their participation in the Regional Program for Conservation of Coastal and Marine Resources, a new integrated network of protected marine areas to address rapidly declining fishing stocks. (August-September 2003) Ref.990

International Year of Deserts and Desertification—2006
The UN has declared 2006 the International Year of Deserts and Desertification to help raise global public awareness of the threat that advancing deserts and desertification represent to humanity, and consequently to increase efforts to explore ways to cope, counter, or even reverse these phenomena. “…desertification has been seen as a threat to human security,” notes UN Convention to Combat Desertification Executive Secretary, Hama Arba Diallo. The southern progression of the Sahara increases famine and migration, escalating conflicts across Africa. December 2006 is the 10th anniversary of the UN Convention to Combat Desertification with 191 states parties. (January 2006) Ref. 991
Chemicals and other Hazardous Compounds

Montreal Protocol
First Extraordinary Meeting of the Parties to the Montreal Protocol Gives One-Year Extension to Ban on Methyl Bromide to 11 Developed Countries
Among the parties to the Montreal Protocol, eleven industrialized countries have been granted "critical use exemptions" on the use of the pesticide and fumigant methyl bromide. The exemptions give users of methyl bromide a one-year extension to adopt cost-effective substitutes for this ozone-destroying substance. The 1987 Montreal Protocol requires the signatory states to phase out the use of nearly 100 chemicals that damage the ozone layer. (March 2004) Ref. 993

Ozone Continues to Thin over Antarctica Casting Doubt on Success of the Montreal Protocol
The World Meteorological Organization estimates that the ozone hole over Antarctica this year is 8% larger than its peak in 2007 and it might take another 50 years to completely recover. Nevertheless, without the Montreal Protocol, the impact at the polar regions would have been more significant, shows the “world avoided” computer model, which considers only chlorine changes, all the other variables being constant. [See also Call for Expanding Montreal Protocol on Ozone-Depleting Substances in September 2007, and other similar items on this issue in previous environmental security reports.] (September 2008) Ref. 994

Stockholm Convention came into Force May 17, 2004

Stockholm Convention on POPs to be expanded
New Chemicals Proposed to be Added to Stockholm Convention on POPs
The Punta del Este meeting of the parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) established a POPs Review Committee that will be responsible for evaluating additional chemicals that can be added to the current list of 12. Four candidate chemicals were given to the Committee, whose first meeting will be held in Geneva later this year, with its recommendations forwarded to future annual meetings of the Conference of the Parties to the Convention. The four candidates for phaseout are: the flame retardant pentabromodiphenyl; the hexachlorocyclohexanes, including the pesticide lindane; the pesticide chlordecone; and the flame retardant hexabromobiphenyl. (May 2005) The First Meeting of the Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) will be held in Punta del Este, Uruguay from 2-6 May, 2005 and is anticipated to be attended by 800 government officials and observers from 130 countries. The Conference is expected to establish a process for evaluating future POPs candidates to add to the list, and to discuss best policies and strategies for implementing the Convention’s requirements with Guidelines on Best Available Techniques and Environmental Practices. (April 2005) Ref. 996
New Compounds Considered under the Stockholm and Rotterdam Conventions
Several more persistent organic pollutants may be banned or restricted under the Stockholm Convention. In addition to five substances already short-listed in 2007, the fourth meeting of the Persistent Organic Pollutants Review Committee (COP-4) approved four chemicals to be listed under Annexes A, B, or C: commercial octabromodiphenyl ether (c-octaBDE), pentachlorobenzene (PeCB), and alpha- and beta-hexachlorocyclohexane (alphaHCH and betaHCH), and suggested further evaluation for endosulfan and hexabromocyclododecane (HBCD) to be listed under the Convention. (October 2008) Ref.997

Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties
The 2001 Stockholm Convention banning the most dangerous Persistent Organic Pollutants (POPs) came into force on May 17, 2004. The UN-backed treaty is banning hazardous pesticides, dioxins and polychlorinated biphenyls (PCBs), as part of the UN effort to eliminate the worst health-threatening pollutants. The twelve POPs covered so far by the Convention are: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, polychlorinated biphenols (PCBs), hexachlorobenzene, dioxins and furans. Many experts consider the "dirty dozen" list too short. The first Conference of the Parties to the Convention (COP 1) to be held in Punta del Este, Uruguay, in early 2005 will establish a committee for evaluating other potential chemicals and pesticides to be added to the list. The COP will also finalize guidelines for promoting “best environmental practices” and “best available techniques” that can reduce or eliminate releases of the most toxic POPs. (May 2004)

EU Ratified the Stockholm Convention and Proposes new POPs to be banned
EU ratified the Stockholm Convention that bans the use of POPs. The treaty entered into force on May 17, 2004. So far it has been ratified by 83 countries, among them 13 EU member states. As Party to the Treaty, the European Commission says that it has already prepared a list of nine additional POPs to propose to be banned under the Convention. (November 2004) Ref. 998

The European Union has proposed banning additional chemicals beyond those found on the Stockholm Convention’s list. The chemicals include: hexachlorobutadiene, octabromodiphenyl ether, pentachlorobenzene, polychlorinated naphthalenes, short-chained chlorinated paraffins, pentabromodiphenyl ether, chlordecone, hexabromobifenyln, and hexachlorocyclohexane. (August 2004) Ref. 999

Stockholm Convention on POPs Adopts Evaluation but not Non-compliance Mechanisms
The third meeting of the Conference of the Parties (COP-3) to the Stockholm Convention on Persistent Organic Pollutants (POPs) occurred April 30-May 4, 2007, in Dakar, Senegal, with over 450 participants representing more than 180 governments and international and non-governmental organizations. Twenty-two decisions were adopted, including: measures to reduce or eliminate releases from wastes (integration with the Basel Convention for developing a framework for environmentally sound waste disposal); guidelines on best available techniques and draft guidance on best environmental practices; improving the reporting system; evaluation of implementation effectiveness through the Global Monitoring Programme (establishing a coordination group formed of three representatives from each of the five UN regions); technical assistance; and non-compliance (negotiations to continue and mechanisms to be considered for COP-4). COP-4 will be held May 4-8, 2009, in Geneva, Switzerland. (May 2007) Ref. 1000
Stockholm Convention to be Updated
The first meeting of the Persistent Organic Pollutants Review Committee (POPRC), held in Geneva on 7-11 November 2005, determined that all five chemicals proposed for inclusion in the Convention (pentabromodiphenyl ether, chlordecone, hexabromobiphenyl, lindane, and PFOS) fulfilled the screening criteria as stipulated in Annex D of the Convention and also adopted a draft outline of the risk profile for the new POP candidates. The first meeting of the Expert Group on Best Available Techniques and Best Environmental Practices to comply with the Stockholm Convention will be held in Geneva, Switzerland, 28 November–2 December 2005. [See also Sweden Calls for World Ban on PFOS Chemical in June 2005, New Chemicals Proposed to be Added to Stockholm Convention on POPs in May 2005, and Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties in the April 2005 environmental security scanning reports.]

This month India has ratified the Stockholm Convention, considerably increasing environmental protection in that economically fast-growing Asian country. (November 2005) Ref. 1001

Sweden Calls for World Ban on PFOS Chemical
Sweden proposes a global ban on perfluorooctane sulfonate (PFOS), a chemical used by a number of industries including semiconductor makers, and which might be harmful to human and animal health. Sweden would propose the ban under the Stockholm Convention. Sweden hopes that if the approval of the regulation takes a long time, the scientific evidence will convince countries to take independent advance actions to phase out PFOS. [See also Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties in the April 2005, and 8.2 New Chemicals Proposed to be Added to Stockholm Convention on POPs in May 2005 environmental security scanning reports.] (June 2005) Ref. 1002

Stockholm Convention Meeting to Look at Concrete Actions and Policies
The Second Meeting of the Conference of the Parties to the Stockholm Convention (COP 2) on Persistent Organic Pollutants (POPs) will be held in Geneva, May 1–5, 2006. Representatives of Parties to the Convention will review progress and discuss specific activities, policies, and investments at the national and community levels that would help POPs reduction. The conference agenda includes: strengthening of a global monitoring network to track the levels of POPs in the environment; technical assistance; non-compliance; liability; and the redress of issues. Presently there are 12 POPs covered by the Convention and more chemicals are under technical review and expected to be added to the list in coming years. [See also Stockholm Convention Updates in November 2005 and other previous environmental security scanning reports.] Note: we will report on the COP-2 outcomes in the May environmental security scanning report. (April 2006) Ref. 1003

Stockholm Convention on Persistent Organic Pollutants Is Succeeding in Europe
A recent study has evaluated the effectiveness of the Convention on Long-range Transboundary Air Pollution (LRTAP) in the UN Economic Commission for Europe countries, excluding Canada and the US. The research revealed that many persistent organic pollutants (POPs) decreased considerably and will continue to decrease as the LRTAP POP protocol is becoming fully implemented by all countries. These results are significant for the global Stockholm
Convention on Persistent Organic Pollutants and for developing a global monitoring plan for POPs. The study also included preliminary assessments for eight “candidate” POPs (Hexachlorobutadiene (HBU); Pentabromodiphenyl ether (PBDE); Pentachlorobenzene (PCBe); Polychlorinated naftalenes (PCN); Pentachlorophenol (PCP); Endosulfan, Dicofol; and short chain chlorinated paraffins (SCCPs)) which could be added to the POP list in the future. [See also Stockholm Convention on POPs Adopts Evaluation but not Non-compliance Mechanisms in May 2007, New Chemicals Proposed to be Added to Stockholm Convention on POPs in 2005, and other related items in previous environmental security scanning reports.] (February 2008) Ref. 1004

Rotterdam Convention on PIC for Certain Hazardous Chemicals and Pesticides in International Trade to be Expanded

The first Conference of the Parties to Rotterdam Convention on Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade was held in Geneva, 20-24 September 2004. The delegates approved 14 new hazardous substances to be added to the initial 27 substances already on the UN-backed treaty list. The conference also established a Chemical Review Committee to assess future proposals to add new chemicals and pesticides to the PIC list, as well as finalize other administrative procedures necessary for good operations. The fourteen new additions are: binapacryl; toxaphene; ethylene dichloride; ethylene oxide; monocrotophos; DNOC and its salts; dustable powder containing a combination of benomyl at or above 7 per cent, carbofuran at or above 10 per cent and thiram at or above 15 per cent; amosite, actinolite, anthophyllite and tremolite asbestos; tetraethyl lead and tetramethyl lead; parathion; and chrysotile asbestos. (September 2004) Ref. 1005

Global Classification and Labeling System For Chemicals

A New Global Classification And Labeling System For Chemicals (GHS)

After a decade of negotiations the UN Committee of Experts on the Transport of Dangerous Goods and the Globally Harmonized System of Classification and Labeling of Chemicals adopted a new global system on chemical safety in Geneva. The Globally Harmonized System for the Labeling and Classification of Chemicals (GHS) includes measures on proper management, hazard classification and pictogram labeling of chemicals. The GHS adds to the harmonized classification and labeling already in place for the transportation sector application to the workplace and consumer sectors. The Committee is a UN Economic and Social Council (ECOSOC) subsidiary body and operates through the UN Economic Commission for Europe. The mandate for this work was adopted under Agenda 21 at the 1992 UN Conference on Environment and Development, and the Plan of Implementation was adopted on 4 September 2002 at the World Summit on Sustainable Development in Johannesburg. Countries are encouraged to have the new system fully operational by 2008. A UN publication of the GHS text will be available in 2003. (December 2002) Ref 1006

Intergovernmental Forum on Chemical Safety becomes part of the International Conference on Chemicals Management

The Intergovernmental Forum on Chemical Safety will be integrated into the International Conference on Chemicals Management (ICCM) as an advisory body providing an open, transparent and inclusive forum for addressing new and emerging issues related to sound
chemicals management. The decision was taken at the sixth session of the IFCS, held in Dakar, Senegal, September 15-19, 2008. The Forum also considered nanotechnology issues, decided to include manufactured nanomaterials on its agenda, and discussed (without reaching consensus) international transport of lead and cadmium via trade. [See also Call for Global Ban on Lead-based Paints in October 2007, Call for Reinforcements to Chemical Safety in September 2006, and other related items in previous environmental security scanning reports.] (September 2008) Ref.1007

REACH Program

*European Chemicals Agency created under the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program*

On 31 October 2003, the European Commission submitted to the European Parliament a proposal for the establishment of the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program. One of the most important elements in the proposed regulation is the establishment of a European Chemicals Agency. The European Commission itself will establish guidelines for the enforcement of the REACH program. (January 2004, May, August and April 2003, and November 2002) Ref. 1009

REACH Entered into Force on June 1, 2007

The EU chemicals law, Registration, Evaluation, Authorization and Restrictions of Chemicals (REACH) entered into force on June 1. The law’s managerial body, the European Chemicals Agency (ECHA) in Helsinki, officially began its operations. REACH is regulating the manufacturing, marketing, import, and use of all chemicals in the EU through a single system. The chemicals have to be registered over the next 11 years with the ECHA. REACH will significantly improve protection of human health and the environment while encouraging innovation and keeping the EU's chemical industry competitive. "[REACH] is the most progressive chemicals legislation in the world," said EU Environment Commissioner Stavros Dimas. (June 2007) Ref. 1010

REACH, Europe’s Chemical Regulations to Enter into Force on June 1, 2007

The REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals) was approved by the European Parliament and the European Commission and will enter into force on June 1, 2007. REACH is regulating the manufacturing, marketing, import, and use of some 30,000 chemicals and is replacing 40 existing pieces of legislation, thus creating a single system for all chemicals in the European Union. The chemicals have to be registered over the next 11 years with the new European Chemicals Agency (ECHA) in Helsinki, which will be responsible for management of the new requirements. [See also International Controversies over REACH in June 2006, Integration of Chemical Regulations (REACH) Approved by European Council in December 2005, and other related items in previous environmental security reports.] (December 2006) Ref. 1011

EU to Add Carbon and Graphite to REACH Program

Carbon and graphite were deleted from the list of exemptions (Annex IV) of the EU’s Registration, Evaluation, Authorization and Restrictions of Chemicals (REACH) regulation, due
to possible health hazards when they are used in nano-sized form (as in carbon nanotubes).
Therefore, companies producing, using, or trading with carbon and graphite now have to
comply with the REACH requirements. REACH entered into force on June 1, 2007 and its
administrative office, the European Chemicals Agency, was inaugurated in Helsinki on June 3,
2008. [See also New Study Raises Asbestos-type Health Worries for Nanotubes in May 2008
environmental security report.] (June 2008) Ref.1012

EU Updates the REACH System, and WEEE and RoHS Directives
The EU Member States agreed to align EU legislation on classification, labeling and packaging
of substances and mixtures to the UN Globally Harmonized System, as part of a global effort to
protect humans and the environment from hazardous effects of chemicals. The new regulation
will complement the EU REACH system, which is already in force.
The European Commission proposed a revision of the Waste Electric and Electronic Equipment
(WEEE) directives and restrictions on: the use of certain hazardous substances in electrical and
electronic equipment (RoHS) for greater coherence with other EU regulations (such as the
labeling system, the waste framework, and REACH), easier implementation and enforcement,
and higher but more flexible targets. Concerning the WEEE directive, the current collection
target of 4 kg per person per year would be replaced by a mandatory collection target equal to
65% of the average weight of electrical and electronic equipment placed on the market over the
two previous years in each Member State. [See also EC Enforces Compliance of National
Legislation with EU Environmental Regulations in October 2007 and other related items in
previous environmental security reports.] (December 2008) Ref. 1013

REACH Draft Voted by the European Parliament
The draft REACH (Registration, Evaluation and Authorization of Chemicals) regulation passed
the European Parliament on November 17th. Since just fewer than 300 out of more than 1,000
proposed amendments survived, the result pleased neither industrialists, nor environmentalists
and the lobbying continues intensely on what might be one of the EU's most important pieces of
legislation so far. As it stands now, the priority for screening potentially hazardous substances
would be set by volume rather than by risk measures—as was the original plan. The British EU
presidency is pushing to pass the regulation by the end of the year. However, that depends on the
vote of the EU Council of Ministers due to meet on December 19th. If the Parliament's
amendments are not accepted, than the bill might be sent back for a second reading and the
debate would go on. [See also The REACH Debate Continues and other related listed items in
October 2005 environmental security report.] (November 2005) Ref. 1014

The REACH Debate Continues
The full assembly vote on REACH (Registration, Evaluation and Authorisation of Chemicals), a
regulation designed to reduce the impacts of hazardous chemicals on public health and the
environment, is scheduled for November. However, the debate continues among different
European parliamentary committees, industry lobbying groups, and environmental groups. The
environment committee, which has the lead role in shepherding REACH, supported changes that
would ease requirements for companies that deal with listed hazardous substances in volumes of
1-10 tonnes annually; but, would keep the registration rules for those handling over 10 tonnes
annually, while another parliamentary committee recommended just requiring companies to
replace hazardous substances with safe ones when substitutes are available. The European Eco-
Forum pleads for strengthening REACH and extending it to the rest of the pan-European region, a suggestion that they want to include on the agenda of the Belgrade 2007 “Environment For Europe” Conference. [See also REACH Closer to Finale in August 2005, The REACH Program Closer to Entry Into Force in March 2005, Leading Cancer Specialists call for REACH Strengthening in May 2004, and EU Chemical Policy Reforms in January 2004 environmental security reports.] (October 2005) Ref. 1015

REACH Closer to Finale
The drafting of the Registration, Evaluation and Authorization of Chemicals (REACH) legislation is in its final phases as it moves through committees in the European Parliament. The vote on it is scheduled for November. REACH provides a legal framework for controlling hazardous chemicals, requiring manufacturers and importers to register the physical, chemical and toxicological properties of substances with a central EU database, provide lifecycle safety and environmental risks information, and eventually get a special authorization for those of high concern. Britain, which holds the EU's rotating presidency, hopes that agreement on the program will be reached by the end of the year. [See also The REACH Program Closer to Entry Into Force in March 2005, Leading Cancer Specialists call for REACH Strengthening in May 2004, and EU Chemical Policy Reforms in January 2004 environmental security reports.] (August 2005) Ref. 1016

International controversies over REACH
Thirteen of the EU's top trading partners, including the United States, Australia and Japan, urged the EU to reconsider some of the harsh terms of its REACH (Registration, Evaluation and Authorisation of Chemicals) bill, since they are hard to implement and thus might hurt trade. REACH would require that the properties of about 30,000 chemicals produced or imported in the EU be registered with a central agency, while those of highest concern, like carcinogens, would require further testing and authorization. REACH is expected to get a second reading in the European Parliament later this year. [See also Integration of Chemical Regulations (REACH) Approved by European Council in December 2005, The REACH Program Closer to Entry into Force in March 2005, and other related items in previous environmental security reports.] Ref. 1017

REACH Program Closer to Entry into Force
The Registration, Evaluation and Authorization of Chemicals (REACH) legislation for controlling hazardous chemicals is likely to enter into effect in 2006 or shortly thereafter. It has already passed the legislative process, but the EU Commission has to approve it, and some modifications are possible. Manufacturers, importers and users who exceed the established threshold of 1,000 metric tons/yr will have to provide physical, chemical and toxicological data. Lifecycle safety and environmental risks for specific uses will have to be provided. "High concern" and "very high concern" are designations for chemicals that will need 1) tight management or possible substitution or 2) "are carcinogenic, mutagenic, or toxic to reproduction (CMRs); persistent, bio-accumulative and toxic (PBTs); very persistent and very bio-accumulative (vPvBs); persistent organic pollutants (POPs); or have equivalent properties", respectively. Owing to the EU's large trade volume, impacts of this legislation will be worldwide. Provision is made for an agency to securely handle proprietary information. Some 30,000 chemicals are expected to be controlled by this legislation/policy. Full registration of a
given chemical must be completed within three years of final enactment of REACH, or manufacture, importation and use will have to cease. As with the U.S. Toxic Substances Control Act, REACH supplements the Rotterdam Convention. (March 2005) Ref. and Related items 1018

**Leading Cancer Specialists call for REACH Strengthening**
At a colloquium organized by the French Association for Research on Treatments Against Cancer at UNESCO Headquarters, a transatlantic group of leading cancer specialists presented scientific evidence on the necessity of strengthening the Registration, Evaluation and Authorization of Chemicals (REACH) policy, in order to better control carcinogenic chemicals. The participant experts stated that REACH was much weakened under the pressure of the chemicals industry from both sides of the Atlantic. Corinne LePage, a French lawyer, wants to “advance the idea that polluting is a crime against humanity.” (May 2004) Ref.1019

**Agreement on International Carriage of Dangerous Goods by Inland Waterways (ADN) Closer to Entry into Force**
The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) is two ratifications away for entering into force. The ADN aims to set up high-level safety standards for the entire European Inland Waterways Network by a main legal text and regulations concerning the international carriage of dangerous goods by inland waterways; and effective prevention of pollution resulting from accidents or incidents during the carriage; while facilitating transport operations and promoting international trade in chemicals. (March 2006) Ref. 1020

**Protocol on Heavy Metals**
The Protocol on Heavy Metals entered into force on 29 December 2003
The Protocol on Heavy Metals has as objective to control emissions of man-made heavy metals (cadmium, lead, and mercury) that are harmful to health and the environment. The protocol entered into force in December 2003. (October 2003) Ref. 1021

**Ban on Mercury**
EU Legislation Banning Mercury Exports in Effect in 2011
Legislation banning all exports of mercury from the European Union takes effect in March 2011. The EU is the world’s biggest exporter, responsible for about 25% of the global mercury supply. The export ban is part of the EU’s strategy for reducing the global supply of mercury and thereby addressing mercury pollution globally. [See also Progress on Global Mercury Ban in February 2007 and other previous environmental security reports on this issue.] (October 2008) Ref. 1022

**EU to Ban the use of Cadmium in Batteries**
As part of its effort for reducing environmental pollution from heavy metals, the EU has decided to ban the use of cadmium in consumer batteries. Cordless power tools, medical equipment, emergency lighting, and alarm systems are exempted so far, but in 2008 when the law will be reviewed, the European Commission might propose a complete ban—as previously suggested by such countries as Sweden and Denmark. The environmental ministers also set collection targets for portable batteries. After adapting their national legislation to the new EU regulations, in the
first four years, 25% of all used batteries should be collected on their territories; while after eight years the rate rises to 45%. The new legislation is awaiting European Parliament approval. (December 2004) Ref. 1023

France Bans 30 Pesticide Components
As of February 2008, France banned the sale of 1,500 pesticides containing any of 30 chemicals deemed hazardous, planning to gradually phase out a total of 53 phytosanitary substances. (February 2008) Ref. 1024

Restrictions on Plastic Bags Expanding
More than 40 jurisdictions around the world have imposed or are considering restrictions or taxes on plastic bags. China is outlawing plastic bags from all public transportation, prohibits their free distribution at shopping points, bans the production and use of ultra-thin (less than 0.025 mm) non-biodegradable plastic bags, and will establish new criteria for the production of plastic bags. Firms not complying will face penalties. The new regulation will come into effect on June 1, 2008. Similar regulations were introduced in Bangladesh, Uganda, and South Africa. The Australian Federal Environment Minister announced intentions to phase out plastic bags by the end of the year and, according to UNEP, the problem is also on the agenda of almost every African country. [See also Plastic Bags Taxed and/or Banned in October 2005 environmental security report.] (January 2008) Ref.1025

Plastic Bags Taxed and/or Banned
Several jurisdictions, including Ireland, Taiwan, Bangladesh, and some Indian states are banning or taxing the use of plastic bags because of their potential as litter, their role in clogging flood control channels, and their threat to wildlife. Maharashtra blames them for floods that killed more than a thousand people. (September 2005) Ref. 1026

India to Enact Regulation Curbing Plastic Bags Use
India’s regulation to curb plastic bags gets increased enforcement by the decision of the city of Delhi to outlaw the, “use, storage and sale”, of all polyethylene bags, and apply severe penalties for non-compliance. The law is effective immediately, and applies to customers and retailers alike, but the first target is manufacturers, to restrict availability. India thus joins other countries that have introduced similar regulations. (January 2009) Ref. 1027

Forests Management

United Nations Agreement to Protect the World’s Forests Adopted
Although not a legally binding document, the agreement on international forest policy and cooperation is an important instrument for sustainable forest management. By setting international standards for forest management, the agreement is expected to advance international cooperation on forest conservation, improve forest products trade, and develop national policies that would reduce deforestation, prevent forest degradation, and improve the living standard of all forest-dependent peoples. The agreement was adopted at the United Nations Forum on Forests, following 15 years of negotiations and debates on whether a treaty or an agreement is needed for improving the world’s forests management. A voluntary global
financing mechanism for forest management is supposed to be adopted by 2009. (May 2007) Ref. 1029

UN General Assembly Adopts Global Forest Agreement
The “Non-Legally Binding Instrument on All Types of Forests” adopted by the UN General Assembly on December 17, 2007 sets the political framework and standards for sustainable forest management and monitoring to stabilize climate change and protect biodiversity and ecosystems. The agreement suggests mechanisms for systematic monitoring and reporting at the national level, as well as means for international collaboration, ranging from funding developing countries for reducing deforestation, to technology transfer and capacity building for forest management. Although not binding, the forests agreement is an important political instrument to improve nations’ forest management. (December 2007) Ref.1030

Sustainable Forest Management Raised on Global Political Agenda
The XII World Forestry Congress (held once every five years) was hosted by the UN Food and Agriculture Organization (FAO) at the end of September, in Quebec City and attended by more than 4,000 participants from 140 countries. For the first time, the Congress addressed humans’ dependency on the forest, stating that worldwide, some 1.6 billion people rely on forests for their livelihoods and therefore underlined the importance of reinstating forest issues higher on the political agenda. The “Final Statement: Forests, Source of Life” listed principles, objectives, and strategies including the formulation and enforcement of legislation that relates to sustainable forest management. The FAO is responsible for monitoring, assessing and reporting on progress on the implementation of the conclusions of the Congress. It must also present a progress report to the XIII World Forestry Congress to take place in 2009. It is likely that international forest-related agreements with national implications for legislation will emerge to better secure sustainable forest management. (October 2003) Ref.1031

Call for Legally Binding Agreement for Forests’ Conservation
UN Forum on Forests 5th Session, held 16–27 May 2005, reviewed the effectiveness of the International Arrangement on Forests and determined that better international regulations, management mechanisms, and long-term political commitments are needed to improve forest conservation. Several officials called for a legally binding instrument and quantifiable targets eventually linked to the Millennium Development Goals. [These goals will be reviewed for possible modification at the UN General Assembly meeting in September 2005.] The delegates failed to reach agreement on future international arrangements and improving international regulations on forests. The next UNFF is planned for February 13, 2006. During the Forum, the World Wildlife Federation and the World Bank renewed their World Bank/WWF Alliance for Forest Conservation and Sustainable Use and announced their new forest protection goal to cut global deforestation 10% by 2010. (May 2005) Ref. 1032

Deforestation Not Yet Adequately Addressed by International Regulations
The UN Convention on Biological Diversity held a five-day meeting in Rome, Italy, to discuss how agricultural and forest biodiversity are affected by climate change. A focus was on mangrove: according to scientists, 20% of mangrove forests have been lost, and economic and environmental damages should be addressed. Mangroves’ destruction could cause biodiversity loss in tropical areas, increase CO₂ emissions, and destroy people’s livelihoods. There are no
strategies yet to deal with the situation, although scientists warn that if not addressed now, in the next ten years the crisis could get out of control. Along the same lines, African forestry protection organizations and the Food and Agricultural Organization (FAO) held a meeting on specific climate change issues, discussing strategies to find the best compromise between humans’ interests, food crops, deforestation, and wildlife. Environmental degradation and loss of livelihood due to deforestation are underlying and/or multiplier causes of conflict, mainly in already fragile states or conflict-torn regions. (February 2008) Ref.1033

Sixth UN Forum on Forests Agrees to Multi-Year Work Plan
The two-week UN Forum on Forests held in New York, February 13–24, assessed the issues of management, conservation, and sustainable development of all forests worldwide. The focus was on re-assessing the International Agreements on Forests (IAF), and the establishment of an international legally binding instrument (LBI), promoted by members such as Canada and China; however, countries like Brazil emphasized voluntary measures. The accord on the LBI will be concluded and adopted next year, at the Seventh UN Forum on Forests. Agreement was reached on a multi-year program of work, including more substantial progress on reporting. Most speakers highlighted that besides the forests’ ecological role, their management has important security implications, since the livelihood of millions of people depends on forests. (February 2006) Ref. 1034

International Alliance of Forest Peoples
The International Alliance of Forest Peoples was established by the participants in the Peoples of the Forest and Climate Change workshop held in Manaus, Brazil. The scope of the Alliance is to improve international collaboration to guarantee the respect of forest people’s rights to land and natural resources and to their traditional livelihoods, facilitate their adaptation to climate change, and improve their participation in the mechanisms for the reduction of emissions from deforestation and forest degradation. The Declaration was signed by 11 countries: Brazil, Ecuador, Colombia, Costa Rica, Guyana, French Guyana, Paraguay, Nicaragua, Venezuela, Suriname, and Panama. Delegations from Africa (Democratic Republic of the Congo) and Asia (Indonesia) and observers from the UN and NGOs from Brazil, England and the U.S. also attended the meeting. (April 2008) Ref.1035

Rights of Forest Peoples Need to Be Observed in Anti-deforestation Efforts
Research from the Rights and Resources Initiative, announced at the Rights, Forests and Climate Change conference in Oslo, has now shown that the financial costs of setting up legal rights for forest-dwelling peoples are around $3.35 per hectare compared with the estimated costs for elements of the UN-proposed Reduced Emissions from Deforestation and Forest Degradation (REDD) program ($800 to $3500 per hectare each year for the next 22 years), but can make a large difference in the efforts aimed at reducing deforestation. Ignoring these rights can cause serious problems for the efforts, and full advantage should be taken of those peoples’ well-informed help in protecting what is, after all, their environment. The IUCN’s World Conservation Congress also endorsed the REDD “as long as it remains just and equitable.” (October 2008) Ref.1036

African Rain Forest Protection—International Treaty signed in February 2005
At the Second Summit of Heads of State and Government of Central Africa on the Conservation
and Sustainable Management of the Central African Forest Ecosystems, on February 5th, Central African countries signed a landmark regional conservation treaty, establishing cross-border partnerships to help save the world's second largest rain forest. The treaty will make it easier for countries to jointly track and combat poachers, manage funds for training and conservation, and harmonize laws in different countries that regulate logging. In his message, Secretary-General Kofi Annan stressed the linkage between forest ecosystems and security in the region. (February 2005) Ref. 1037

Greenhouse Gas Emissions

Kyoto Protocol Came into Force in February 2005
The UN Kyoto Protocol to the 1992 UN Framework Convention on Climate Change (UNFCCC) came into force on February 16, 2005. Under the Protocol, the industrialized Member States are bound to reduce their combined greenhouse gas emissions that contribute to global warming by at least 5% under 1990 levels by 2012. The six major greenhouse gases covered by the Protocol are: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆). So far the Protocol was ratified by 128 states. Plans for post-Kyoto climate change policies and strategies have already begun. A “G8 Plus” group (including key developing industrial countries China, India and Brazil) could emerge to advance Kyoto by helping emerging industrial nations to develop “clean” technologies based on G8 scientific advances. (February 2005) Ref. 1038

Carbon Trading Scheme

Clean Development Mechanism (CDM) successful
The UNFCCC Secretariat Director considers the Kyoto Protocol’s Clean Development Mechanism (CDM) successful so far, with some 645 CDM projects being registered in 44 countries, covering a wide range of sectors. At the same time, he cautioned that serious negotiations on a post-2012 regime would only be launched at the Bali conference, and not concluded there, given experience with the Kyoto Protocol, which took two years to negotiate and another two to ratify and bring into force. Australia's government is developing a carbon emissions reduction plan that would recommend a trading scheme built on the six-nation Asia-Pacific Partnership on Clean Development and Climate (which includes Australia, China, India, Japan, South Korea, and the U.S.) The proposal is planned to be put forward at the 2007 Summit of the Asia-Pacific Economic Cooperation to be held in Sydney, in September. (May 2007) Ref. 1039

Countries Contemplating Tougher Regulations for Mandatory Emission Targets
In light of last month’s report, The Economics of Climate Change, the UK announced its intention to introduce new "green" measures to reduce carbon emission, including the Climate Change Bill—to reduce CO₂ emissions by 60% by 2050, and to strengthen official monitoring and reporting. The UK also proposes to set an emissions reduction target of 30% by 2020, and at least 60% by 2050 Europe-wide. Australians polled would favor ratification of the Kyoto Protocol and more stringent reductions, and its government advocates an Asia-wide emissions trading system as part of a planned "new-Kyoto" pact and would invest US$46.5 million into the world's biggest carbon capture and storage system. [Note: A proposal to allow Clean
Development Mechanism (CDM) funds to be used for carbon capture and storage (CCS) projects was deferred by the Climate Change Conference on grounds that the technology is not yet mature. Japan cannot meet its obligations under the Kyoto Protocol unless it imposes mandatory emission targets on industry and increases spending for carbon credits using Kyoto tools such as the Clean Development Mechanism. [See also UK Proposes Individual Carbon Trading in July 2006, Possible Tougher European Carbon Limits in May 2006, and other related items in previous environmental security reports.] (November 2006) Ref. 1040

UK Proposes Individual Carbon Trading
The UK Minister of the Environment has proposed a plan for individual carbon-trading procedures. Under the proposal, all UK citizens would be allocated a certain annual amount of carbon credits that will be reduced each time they purchase non-renewable energy. The points will be stored on an electronic card and those who did not use their full allocation would be able to sell their surplus carbon points into a central bank, while those who run out of points will be charged additionally at the point of sale for the equivalent of the missing points. To reduce total UK emissions, the overall number of points would be reduced each year. Details and the place for launching the pilot project should be announced shortly. If the new UK carbon-trading scheme proves feasible and efficient, it is likely that it will be emulated in other (if not all) EU countries and possibly even other regions of the world strongly committed to reducing their carbon emissions. [See also Possible Tougher European Carbon Limits in May 2006 and other related items in previous environmental security reports.] (July 2006) Ref. 1041

EU Greenhouse Gas Emission Trading Scheme (EU ETS)
European Union (EU) Directive 2003/87/EC entered into force on 25 October 2003 to implement carbon dioxide allowance trading, which became formally active on January 1, 2005. Over-the-counter allowance trading had begun even before January 1, though formal markets will not be established until later in Spring 2005. Approximately 12,000 industrial plants and energy producers in the EU had to begin monitoring and reducing CO2 emissions to meet limits set for 2005 and 2007. The EU has agreed under the Kyoto Protocol to reduce emissions by 8% compared to 1990 levels. Entities exceeding their assigned limits must either find methods to reduce them or to buy unused allowances from entities that are operating under their own limits. Plans for four nations have not been approved so far: Czech Republic, Greece, Italy and Poland. The EU Commission is empowered to accept or reject all or parts of any nation’s plan. Transportation emissions are not included in the requirements, but could be added at some later time. (January 2005) Ref. 1042

World's Mayors Sign Municipal Version of the Kyoto Protocol
Mayors from 70 of the world's largest cities signed the Urban Environmental Accords aiming to tackle global warming by implementing ecologically sustainable policies. The agreement specifies 21 actions that mayors should implement to improve their cities’ environment, covering the domains of energy; waste; urban design; urban nature; transportation; environmental health; and water. It is expected that at least three actions will be implemented each year until World Environment Day 2012. The "Green Cities" event occurred in San Francisco, June 1-5, 2005. (June 2005) Ref. 1043
Australia Cuts Sulfur Content in Transport Fuels
As part of the government's strategy to dramatically reduce urban air pollution, Australia introduced tough new fuel standards by reducing sulfur in unleaded gasoline and in diesel over the next five years. The new standards are estimated to save A$3.4 billion in hospital and medical costs by 2020. (July 2004) Ref. 1044

Health (pandemics)

World Health Assembly adopts new International Health Regulations
The new International Health Regulations adopted by the World Health Organization's annual assembly on May 23, 2005, will increase security against global epidemics of deadly diseases by improving national and international capacity for preventing and responding to disease outbreaks. The new regulations include comprehensive assessment, reporting, and response standards mandatory for each country and to be implemented within a specific timeframe; operational mechanisms; increased collaboration between countries’ health offices and with the WHO; and a better coordinated international reporting and response system. The regulations stipulate the increased roles of countries and WHO in identifying, preventing, and responding to public health emergencies of international concern. WHO should be quickly informed of any outbreak of four diseases—SARS, bird flu, smallpox and polio—as well as any outbreaks of “potential international public health concern” from known or unknown causes or sources. The new regulations will formally come into force two years after approved by the Assembly. (May 2005) Ref. 1046

United Nations Upgrades Early Warning System for Health and Terror Alerts
The United Nations launched the Global Public Health Intelligence Network II (GPHIN II), an upgrade of the GPHIN emergency-preparedness system designed to alert national health agencies to imminent health and terror emergencies. This Internet-based "early warning" system will gather and disseminate preliminary reports of public health threats on a continuous basis to the WHO and public health officials worldwide, helping early detection of potential public health threats including infectious disease outbreaks around the world, whether they are naturally occurring or the result of an act of bioterrorism. The program was developed by Canada's Ministry of Health with support from Nuclear Threat Initiative’s Global Health and Security Initiative. (November 2004) Ref. 1047

EU New Law to Control Bird Flu Epidemics
The European Commission adopted a draft Directive for a law to control bird flu viruses. The new legislation will require EU states to introduce and reinforce surveillance and control measures against low pathogenicity viruses, in order to prevent mutation into a more harmful strain, mostly one that would be transmissible between humans. The new law is expected to enter into force January 1, 2007, replacing the existing one. (April 2005) Ref.1048

Mountains
Carpathian Convention Comes Into Force
The Carpathian Convention came into force on January 4, 2006. Although covering just seven European countries (the Czech Republic, Hungary, the Slovak Republic, Ukraine, Poland, Romania, and Serbia and Montenegro, out of which just the first four are States parties), the Convention has considerable global importance, being seen by other regions as an example to follow. There are already requests for UNEP to expand the Convention to adjacent regions, as well as to consider designing similar treaties for other mountain regions of the world. [See also Fifth Environment for Europe Ministerial Conference in May 2003, and Carpathian Mountain office of the United Nations Environment Programme in July 2004 environmental security reports.] (January 2006) Ref. 1050

The Framework Convention on the Protection and Sustainable Development of the Carpathians intends to be a mechanism of preserving the Carpathians while benefiting isolated mountain communities. (May 2003) Ref1051

Prospective International Agreements for Mountain Regions
The Bishkek Global Mountain Summit (BGMS) was held in Bishkek, Kyrgyzstan, 29 October – 1 November 2002, as the final event of the International Year of Mountains. No proposals for specific treaties or agreements are included in the Draft BGMS Platform, whose final version will be the principal output document from the Summit. However, in preparation for the Summit, a series of Thematic Papers were prepared, one of which was "Prospective International Agreements for Mountain Regions", by Wolfgang E. Burhenne, International Council of Environmental Law, Bonn.
"Prospective International Agreements for Mountain Regions" reveals that there is no legally binding global agreement that specifically addresses mountains-related issues. The document suggests the development of international legal instruments for mountain regions, and presents a checklist and some factors that should be considered in eventual regional mountain ecosystem agreements. The paper also applies outside of the specific "mountain" context and might be used in drafting future treaties for protection of specialized regions or ecosystems. (October 2002) Ref.1052

Waste Management

Waste Export Regulations Revised and Tightened
The ‘Green’ list of the Waste Shipment Regulation, which controls the movement of non-hazardous recyclable waste within, into, or out of the EU, has been updated to better protect the non-OECD countries against receiving from wealthier nations materials they do not want or cannot process in an environmentally sound way. The Revised Green List Regulation 1418/2007 came into effect on 18 December 2007 with a transition period of 60 days for certain wastes and countries. The complementary changes to the UK Transfrontier Shipment of Waste Regulations will come into effect on 5 February. [See also EU Waste Shipment Legislation Came into Force in July 2007 and other related items in previous environmental security reports.] (January 2008) Ref.1054
E-waste Management Directive Came into Effect on August 13, 2005
The EC directive for e-waste management, Waste Electronic and Electrical Equipment (WEEE), has come into effect, requiring that all 25 EU member states comply with the electrical and electronic appliances disposal framework in order to minimize the impacts of this kind of waste on the environment. Among other stipulations, the directive requires that all such devices manufactured in the EU bear a label requiring mandatory recycling. The related directive on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment was also updated, setting maximum concentration values for some substances that were previously supposed to be completely banned in manufacture after July 1, 2006: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). [See also Two E-waste laws entered into force in the European Union of February 2003, and E-waste Directives to be Enforced in the UK of July 2005 environmental security reports.] (August 2005) Ref. 1055

The European Commission's Waste Electrical and Electronic Equipment (WEEE) Directive entered into effect in the United Kingdom on July 1, 2007, after having been effective in the rest of Europe since August 2005. The WEEE Directive is a framework concerning electrical and electronic appliances disposal in order to minimize impacts of this kind of waste on the environment. Among other stipulations, the directive requires that all such devices manufactured in the EU bear a label requiring mandatory recycling. [See also E-waste Management Directive Came into Effect on August 13, 2005 in August 2005 environmental security report] (July 2007) Ref.1056

EU New Strategy on Waste Recycling
The European Commission proposed a new strategy on the prevention and recycling of waste, part of the seven thematic strategies considered under the EU's Sixth Environmental Action Programme (6EAP). The new strategy includes consolidating and updating existing legislation (including the 1975 Waste Framework Directive) and minimizing waste by using it as a resource. It will set recycling standards and will include an obligation for all 25 member states to develop national waste prevention programs. The new regulations and a first set of standards for waste recycling are expected to enter into force in 2008. National governments will then have three years to finalize their own waste action programs. [See also New EU Environmental Strategies in the September 2005, and Recycling Regulations in the EU in August 2005 environmental security reports.] (December 2005) Ref. 1057

EU Batteries Directive Entered into Force
The EU Batteries Directive entered fully into force across the EU on September 26, 2008. It requires waste batteries to be properly collected and recycled by producers and users. [See also Waste Management Policies in June 2008 and other related items in previous environmental security reports.] (October 2008) Ref.1058

China Issues Electronic Waste Rules
The Chinese State Environmental Protection Administration has issued new rules to require manufacturers, retailers and users to take responsibility for electronic waste. The rules are partly inspired by China's thriving (and illegal) industry of importing electronic waste and scavenging it in occupationally unsafe small or family workshops. [See also Global Environmentally Sound

Weapons-related

UN Convention against Nuclear Terrorism
The International Convention for the Suppression of Acts of Nuclear Terrorism was adopted by the General Assembly on April 13, 2005 and will be open for signature on 14 September at the high-level plenary meeting scheduled for the 60th session of the UN General Assembly. The Convention creates an enforced legal framework to counter nuclear terrorism. It will provide for a definition of acts of nuclear terrorism, and covers nuclear safety, crisis and post-crisis situations in accordance with the International Atomic Energy Agency (IAEA) standards. Under its provisions, States are supposed to cooperate by sharing information and assisting each other in preventing terrorist attacks, and the alleged offenders must be prosecuted or extradited. [April 2005] Ref. 1061

Nuclear Terrorism Convention Signed by 82 Countries at the UN Summit
The International Convention for the Suppression of Acts of Nuclear Terrorism was signed by 82 countries at the UN Summit, beginning with Russia, the U.S., and France. The Convention, proposed by Russia in 1998, was adopted by the UN General Assembly in April 2005. [See also UN Convention Against Nuclear Terrorism in November 2005 environmental security report]

Note: The newly released statistics of the IAEA’s Illicit Trafficking Database (ITDB) show a substantial increase in illicit trafficking and unauthorized activities with nuclear and other radioactive materials in 2003-2004. Although the majority of the incidents showed no evidence of criminal activity, the Agency warns of the danger that these materials could be used for malicious purposes, like ‘dirty bombs.’ [See also UN Agency to Intensify Tracking of Illicit Nuclear Trafficking issue in the September 2004 environmental security report.]

(September 2005) Ref. 1062

Chemical Weapon Disposal Continues to Pose Threat
Although no treaty currently requires the recovery of chemical weapons munitions, interest on the part of governments is increasing with respect to how to minimize the hazard and mitigate any significant release of chemical agents into the waters surrounding dumping areas. Since the UN has been consistent in recent years in its interest in long-term and widespread contamination issues, it is reasonable to expect international agreements to address this issue. [January 2004] Ref.1063

Preventing Terrorist Access to Weapons of Mass Destruction—UN resolution
The UN Security Council unanimously adopted on April 28, 2004 a binding resolution criminalizing the production and/or acquisition of weapons of mass destruction by non-state actors. The Council decided that "all States…shall adopt and enforce appropriate effective laws which prohibit any non-State actor to manufacture, acquire, possess, develop, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery, in particular for terrorist purposes, as well as attempts to engage in any of the foregoing activities, participate in..."
them as an accomplice, assist or finance them.” Being considered under Chapter VII of the UN Charter, the resolution is enforceable by the Security Council through tribunals, embargoes, or military force after all peaceful means of persuading delinquent Member States have been exhausted. However, during the debate, it was underlined that the Council would have to get separate approval for the means of enforcement. During the next two years a committee designated by the Security Council will monitor the implementation of the resolution and within six months all States are expected to present reports on their efforts to execute the provisions. 

(April 2004) Ref. 1064

**Sweden Initiates New Commission to Cooperate with the UN to Reduce Proliferation of Weapons of Mass Destruction**

The Weapons of Mass Destruction Commission will provide “proposals on how to make progress in non-proliferation and disarmament of weapons of mass destruction, and on how to minimize the risk of these weapons falling into the hands of terrorists.” The same day, the U.S. proposed a draft U.N. resolution that would criminalize WMD proliferation and ban their transfer to individuals or organizations. (December 2003) Ref. 1065

**New European Union Law Controls Radioactive Sources**

The new European Union Law that controls radioactive sources was adopted on December 22, 2003. The law sets out requirements that ensure control over every present and past high activity radioactive source in Europe. (December 2003) Ref. 1066

**OSCE document on Stockpiles of Conventional Ammunition is a politically binding international instrument that addresses risks arising from ammunition stockpiles**

Foreign Ministers of 55 countries endorsed the OSCE Document on *Stockpiles of Conventional Ammunition*. It is a politically binding international instrument that addresses risks arising from surplus stockpiles of all categories of conventional ammunition, explosive material and detonating devices, stock surpluses that can cause environmental problems and hazards to populations. (December 2003) Ref. 1067

**Protocol on Prohibitions or Restrictions on the Use and Transfer of Mines Other Than Anti-Personnel Mines (MOTAPM)**

Another protocol under negotiation being considered for submission to the next Meeting of the States Parties to the Convention is the Protocol on Prohibitions or Restrictions on the Use and Transfer of Mines Other Than Anti-Personnel Mines (MOTAPM). (November 2003) Ref. 1068


Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006, almost three years after it was adopted. The Protocol stipulates that Parties should take “remedial measures to mark and clear, remove or destroy unexploded ordnance or abandoned explosive ordnance” as early as possible after hostilities have ended, whether they control the territory or not, by cooperating directly or indirectly with all parties involved through quick and accurate information exchange. The Protocol is not retroactive, covering only wars occurring after its entry into force. As of the end of November, there were 27 States Parties to the Protocol. The Portfolio of Mine Action Projects
2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of cluster bombs and other explosives. In 2007, the focus of the Projects will be on unexploded ordnance, aiming to deal with the aftermath of conflicts that took place before Protocol V entered into force. (November 2006) Ref. 1069

**PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES**

**Air Pollution**

**Seventh Conference Of The Parties To The Vienna Convention For The Protection Of The Ozone Layer and Seventeenth Meeting Of The Parties To The Montreal Protocol On Substances That Deplete The Ozone Layer**

The 7th Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer and the 17th Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (COP-7/MOP-17) took place in Dakar, Senegal, from 12-16 December 2005. Over 400 representatives from governments, UN agencies, intergovernmental and NGOs, academia, industry, and the agricultural sector participated. More than 50 decisions were adopted on a wide range of issues concerning phaseout of ozone-depleting substances, budgets, target years, and reducing illegal trafficking in CFCs (chlorofluorocarbons) and other substances. Under the Protocol, developing countries have until 2010 to phase out CFCs and halons, and until 2015 to phase out methyl bromide. (The CFC phaseout year for developed countries was 1996.) Even if all targets of the Montreal Protocol are achieved, the ozone layer will not fully recover until 2065, according to research presented at the conference. This is 15 years later than initially estimated. A new report “Safeguarding the Ozone Layer and the Global Climate System” of the Protocol’s Technology and Economics Assessment Panel and the Intergovernmental Panel on Climate Change demonstrated the interlinkages between ozone and global warming. Parties also agreed to defer until 2006 consideration of a U.S. proposal on multi-year exemptions for methyl bromide, and a European Community (EC) proposal for an amendment to the Protocol that would include an expedited procedure for adding new chemicals. The Eighteenth Meeting of The Parties To The Montreal Protocol: MOP-18 is scheduled to take place in late 2006. [See also *First Extraordinary Meeting of the Parties to the Montreal Protocol Gives One Year Extension to Ban on Methyl Bromide to 11 Developed Countries in March 2004 environmental security report.*] (December 2005) Ref. 1072

**Call for Expanding Montreal Protocol on Ozone-Depleting Substances**

On the 20th anniversary of the Montreal Protocol to curb the release of harmful substances into the atmosphere, 191 signatories of the Protocol gathered in Montreal to celebrate this highly successful international treaty and to discuss its expansion. Delegates agreed to accelerate the freeze and phase-out of hydrochlorofluorocarbons (HCFCs)—chemical compounds used in refrigeration systems and air conditioners, and which accelerate both ozone layer damage and climate change. They agreed to halt the production of HCFCs in 2013 and pull forward their elimination by ten years from the previous scheduled phase-out of 2030 for developed countries, and 2040 for developing ones. The United Nations meteorological agency revealed that greenhouse gases could aggravate ozone loss and slow recovery. The theme of this year’s Ozone Day (September 16) was "Celebrating 20 years of progress in 2007". [See also *2007—The...* ]
International Year of the Ozone Layer in January 2007, Ozone Hole Worst Ever Recorded (under Climate Change item) in October 2006, and other similar items in previous environmental security reports.] (September 2007) Ref.1073

**EU Thematic Strategy on Air Pollution for the CAFE Programme**
Under the EU’s Sixth Environmental Action Programme (6EAP), as part of the Clean Air for Europe (CAFE) strategy, the European Commission proposed the Thematic Strategy on Air Pollution. The Strategy, which aims to improve human and ecosystem health, covers most major air pollutants, with accent on airborne particulates known as PM2.5 and ground-level ozone pollution, and sets a cap on concentrations in the most polluted areas. It aims by 2020 to cut the annual number of premature deaths from air pollution-related diseases by almost 40% from the 2000 level. The strategy also proposes changes to the current regulation system by merging existing legal instruments into a single Ambient Air Quality Directive (that would cut by 50% the existing legal texts) and improving reporting requirements. The proposed legislation still has to be approved by member states and the European Parliament. The other six Thematic Strategies that the Commission will present over the next few months cover Soil protection; Sustainable use of pesticides; Protect and conserve the marine environment; Waste prevention and recycling; Sustainable use of natural resources; and Urban environment. [See also The European Union Environmental Initiatives in January 2005 environmental security report] (September 2005) Ref. 1074

**Vehicle Emissions in Europe**
Emissions from sport utility vehicles and vehicles powered by diesel engines are at the core of vehicle emissions control efforts in Europe. Italy, France, and the UK have already implemented or indicated intent to implement local policies to discourage or ban the use of such vehicles. The health impact of emissions from such vehicles is the source of this emerging policy debate. (July 2004) Ref. 1075

European Commission Proposed Binding Legislation for Vehicle Emissions Cuts
The European Commission proposed binding legislation to cap CO2 emissions from some new passenger cars to 120g/km by 2012. In this way, European carmakers will have to reduce the fleet average CO2 emissions of new vehicles to 130g/km by 2012 through cleaner engines, while the remaining 10g/km would be reduced by improved fuel-efficiency, increased biofuels use, and better traffic management (presently cars count for 12% of the EU’s total CO2 emissions at an average of around 160g/km). The regulation will be enforced by penalties starting in 2012 at €20 per extra gram of CO2, increasing gradually to €95 in 2015. The legislation has to be approved by member states. [See also EU Commission to Propose Binding Cuts on Car Emissions in February 2007 and New European Energy Policy Developments in March 2006 environmental security reports.] Similarly, the Euro VI proposal for heavy motor vehicles establishes a reduction of 80% in nitrogen oxides and 66% in particulate matter emissions compared to the current Euro V limits. After approval by the European Parliament and the Council of Ministers, the new regulation is expected to enter into force in 2013. (December 2007) Ref.1076

**Trans-boundary Pollution Regulations Need Better Enforcement**
A joint lawsuit by Canada and the U.S. against U.S. coal-burning power plants brought back on
the agenda the danger that air pollution generated in any one part of the world poses to other countries and regions. Although regulations exist, their effectiveness is hindered by insufficient adherence or lack of successful enforcement. Better detection and tracking of pollution, global information sharing, and an increasingly informed and active civil society, might change this situation. “Review of compliance by the Parties with their obligations under the Protocols to the Convention” is one of this year’s work plan objectives of the Air Pollution Convention. [See also Study Proposes an International Air Pollution Treaty and Protocol to Control Heavy Metals to Enter into Force in October 2003 and EU Parliamentary Committee Moves to Strengthen Air Pollution Laws in January 2004 environmental security reports.] Ref.1077

**Clean Air for Europe Initiative to Limit Air Pollution**

Clean Air for Europe (CAFE) is an integrated action plan prepared by the EC to further improve the quality of the air for Europeans. An EU Directive of 1999 set limits for some air pollutants, including particulate matter (PM10 - airborne particles with a diameter of 10 micrometers or less), nitrogen dioxide, sulphur dioxide and lead. The limits are to be met by 1 January 2005, with the exception of nitrogen dioxide, which is 2010. The CAFE is the next step, and the Commission is expected to adopt it by mid-2005. European citizens were invited to comment by the end of January about the quality of the air they breathe and suggest measures to improve it. (January 2005) Ref.1078

**2007—The International Year of the Ozone Layer**

The year 2007 is designated The International Year of the Ozone Layer, marking the 20th anniversary of the signing of the Montreal Protocol. Since its entry into force, January 1, 1989, the Montreal Protocol has undergone five revisions, the last one in 1999. “Perhaps the single most successful international agreement to date” (as noted by Kofi Annan, former UN Secretary-General), the treaty is widely adopted and implemented. Nevertheless, due to the accumulative effect, the ozone hole was the largest recorded last September. The next meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer will be hosted by Canada in Montreal, September 17-21, 2007. (January 2007) Ref.1079

**Aquatic Environment**

**A New Step Toward Preventing Water Wars**

Falling water tables around the world increase the likelihood that abuse of international groundwater aquifers will cause conflicts. The International Law Commission adopted draft articles for the first international framework convention on transboundary groundwater aquifers. The articles cover issues related to utilization of transboundary aquifers; activities that have or are likely to have an impact on aquifers; and measures for the protection, preservation, and management of transboundary aquifers. The draft articles create a framework and set of principles for further negotiations to eventually create a binding convention. The articles are compatible with but independent from the UN Convention on the Non-Navigational Uses of International Watercourses (UN Watercourses Convention), and hence, not dependent upon its ratification. The UN Watercourses Convention was adopted in 1997 (with only China, Turkey, and Burundi voting against) and has 16 of the 35 required ratifications to go into force. At the
2008 World Water Week held in Stockholm, the WWF called upon states to support the Convention’s entry into force as a way to prevent future possible conflicts due to competition over water resources. (July-August 2008) Ref 1081

**Draft Agreement for Management of International Aquifers**

The draft Convention on Transboundary Aquifers aims to create a framework for proper management and exploitation of underground water resources, calling on States to cooperate on aquifers’ use and to prevent and control their pollution. Aquifers contain 100 times the volume of surface fresh water, but are largely not covered by international regulations despite their transboundary conditions, and their great environmental, social, economic and strategic importance. The new Convention would apply to 96% of the planet’s freshwater resources. It was prepared by the UN International Law Commission and experts from UNESCO’s International Hydrological Programme, and submitted to the UN General Assembly on October 27, 2008. The same day, UNESCO published the first detailed map of 273 underground transboundary aquifers, including information about the water’s quality and rate of replenishment. (October 2008) Ref.1082

**Marine Environment**

The UN notes that only 0.6% of the oceans are protected compared with 12% of the world’s land, and a roadmap was launched in 2007 to meet the goal of establishing a network of marine protected areas by 2012. The global map of human impacts to marine ecosystems reveals that while no ecosystem is completely unaffected, human activities had high impact on over 40% of the world’s ocean-covered area, with the most affected being the North Sea, the South and East China Seas, the Caribbean, and North America’s East Coast. Although the UN Convention on the Law of the Sea is recognized as the legal framework for all activities in the oceans and seas, the debate continues on how the convention applies to marine genetic resources in areas outside national jurisdictions.

Marine biodiversity protection and management was addressed over the past years by new legal instruments and larger adoption of the existing ones. Maritime conventions and action plans are strengthened and environmental protection and management are improved at global and regional level through better collaboration between national governments, NGOs and international organizations. However, there is consensus that more should be done to protect the marine environment.

**International Conference and Assessments Find Rising Ocean Pollution**

The Second Intergovernmental Review (IGR-2) meeting of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) attended by over 700 participants from some 115 countries was held in Beijing, October 16-20. The delegates assessed progress so far and the main issues concerning ocean pollution, and addressed the actions needed for the next period 2007-2011. Although no legally binding instruments were adopted, “soft law” timetables and measures offering more flexibility and adaptability to countries’ and regions’ specifics were discussed. New scientific estimates released at the meeting reveal that due to pollution, the number of marine ‘dead zones’ or low oxygenated areas may...
have reached 200, threatening fish stocks and the livelihood of people who depend on fisheries. And, an estimated 16% of the world’s coral reefs suffered up to 90% mortality. UNEP new report, *The State of the Marine Environment: Trends and Processes*, is a comprehensive assessment of pollution evolution and trends, warning of critical areas and suggesting recommendations to improve control and reduce contamination caused mainly by discharge of untreated wastewater. The report also notes that the number of coastal dead zones has doubled every decade since 1960, and that coastal ecosystems will be further endangered by rising populations in those areas. Highly populated East Asia discharges 90% of its untreated sewage into water. The Beijing Declaration on Furthering the Implementation of the GPA will be submitted for endorsement to the next UNEP Governing Council/Global Ministerial Environment Forum in February 2007. (October 2006) Ref.1084

**Marine Biodiversity Protection Regulations Need Improvement**

Greenpeace and 17 countries have asked Japan to "cease all its lethal scientific research on whales," that seems to violate international regulations for whales' protection. Japan’s scientific research on whales caused the death of a significant number of protected species. In the first weeks of January, Greenpeace and Japanese whaling fleets have twice come into collision. Greenpeace and the Sea Shepherd Conservation Society are trying to raise international awareness to increase pressure upon Japan to stop its whaling operations. Although the Sea Shepherd Conservation Society, which was pursuing Japanese whaling operators, has said that Japan's whaling operations have been in violation of many international laws, no reprimands have been issued. It takes 75% of the International Whaling Commission’s 66 members to support and make substantive changes to the International Convention for the Regulation of Whaling.

A similar case was brought forward to the UN Law of the Sea Tribunal in the case of Chile v. European Commission on the conservation of swordfish. Both parties submitted the case to the Tribunal at the international level for clarification of several aspects pertaining to marine biodiversity protection. The Tribunal extended the deadline on the proceedings until January 1, 2008. (January 2006) Ref.1085

**Tougher Law of the Sea Regulations Suggested for Marine Genetic Resources**

The UN Open-ended Informal Consultation Process on Oceans and the Law of the Sea produced some recommendations for improving the management and protection of marine genetic resources, including designing enforceable regulations along with liabilities and responsibilities related to marine genetic resources; increasing protection of the marine environment from the effects of man-made factors; and encouraging collaborative research, access and use of marine resources in areas beyond national jurisdiction. Although the UN Convention on the Law of the Sea is recognized as the legal framework for all activities in the oceans and seas, there is disagreement on how the Convention applies to marine genetic resources in areas outside national jurisdictions. The G-77 group of developing countries and China consider marine genetic resources “common heritage of mankind”; while Japan, the U.S. and some other developed countries argue that they fall under the provisions relating to the high seas. The debate will continue in 2008 at the UN Ad Hoc Open-ended Informal Working Group on issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction. (July 2007) Ref.1086
Shipping to Face New Regulations to Reduce Air Pollution

Concerns over air pollution by marine navigation are rising and, similarly to the aviation industry, it is likely that the shipping industry will one day be held responsible and asked to act on its GHG emissions. Given the industry’s global extent, global regulations are needed and expected. The International Maritime Organization (IMO) launched in July a comprehensive study to assess the shipping industry’s contribution to CO₂, sulfur dioxide, toxic nitrous oxide, and particulate emissions, and the impacts on air quality. Results are expected by the end of this year. Along the same lines, the theme of World Maritime Day 2007 was “IMO’s response to current environmental challenges” in order to enhance awareness of the industry’s environmental impact, and trigger compelling action.

Note: This month, Friends of the Earth sued the U.S. EPA in federal district court for failing to meet the April 2007 deadline to regulate air pollution from large ships. Meanwhile, the Marine Vessel Emissions Act of 2007—that would require cleaner fuels and engines in all ocean-going vessels calling at U.S. ports—was introduced in the Senate (SB 1499) and the House of Representatives (HR 2548). (September 2007) Ref.1087

Concerns over Maritime Air Pollution Increase

A new report by the International Maritime Organization reveals that emissions from shipping are rising rapidly; annual CO₂ emission from the world shipping industry reached 1.12 billion tonnes in 2007, representing about 4.5% of global CO₂ emission—three times higher than previously thought—and by 2020 is expected to rise by 30%, making shipping responsible for nearly 6% of global emissions. Sulphur dioxide emissions from ships now stand at 16.2m tonnes a year and are expected to increase by 40%, to 22.7m tonnes by 2020. Nevertheless, emissions from shipping are difficult to regulate by international treaties, due to the complexity of attributing them to individual states. The International Maritime Organization is now assessing regulation proposals and the Sub-Committee on Bulk Liquids and Gases submitted draft amendments to the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI and amendments to the Emission of Nitrogen Oxides from Marine Diesel Engines Technical Code. If approved by the Marine Environment Protection Committee (which meets at the end of March) the amendments could enter into force in March 2010 (or on a date to be decided.) The EPA put forward to the IMO a proposal that vessels be required to switch to cleaner fuel or use clean-up technology to reduce toxic grit from emissions when they are closer to shore, and it hopes that it would be adopted as an international regulation by 2011. EPA also plans to issue its own rules in 2009. Designing more efficient ships, reducing speed, and using higher quality fuel might be some of the easiest and fastest measures for reducing emissions. (February 2008) Ref.1088

London Convention Might be Expanded to Include Ocean-based Geoengineering

Parties to the London Convention on dumping of wastes at sea unanimously decided that a more cautious approach is needed concerning ocean-based geoengineering, which is scientifically unjustified and should be internationally regulated. A coalition of civil society groups suggested that an international process should begin, “to put all geoengineering technologies under intergovernmental oversight.” Thus, other international regulations—such as the UN Convention on Biological Diversity—might also be expanded. The Jeddah Declaration adopted on November 1st by the ninth global meeting of the Regional Seas Conventions and Action Plans also highlights the importance of a healthy marine environment to human security. [See also Tougher

Deep Seas and Open Oceans Need Urgent Conservation Actions

Ecosystems and Biodiversity in Deep Waters and High Seas, a joint UNEP and World Conservation Union (IUCN) report, calls for urgent measures to conserve the world’s entire marine environment—including areas beyond national jurisdictions. More than 90% of the planet’s living biomass is found in oceans and seas, and is jeopardized by human activity, according to the report. Present institutions and conservation efforts are primarily focusing on coastal waters where, until recently, most human activity, like fishing and industrial exploration, took place. As these activities extend beyond those limits, so should the conservation measures. Given that over 60% of the marine world and its rich biodiversity are beyond the limits of national jurisdictions, international guidelines, rules and actions are needed to protect this ecosystem critical to the very existence of life on the planet. (June 2006) Ref. 1090

Ocean/Sea ‘Dead Zones’ was focus of UNEP Governing Council/Global Ministerial Environment Forum

'Environmental Dimension of Water, Sanitation and Human Settlements' was the focus of the 8th Special Session of the UNEP Governing Council and Global Ministerial Environment Forum attended by representatives of 158 nations, in Jeju, South Korea, from 29 to 31 March 2004. At the time of writing of this report the outcomes of the Forum were not yet available. The first discussions were mostly committed to the nearly 150 oxygen-starved or “dead zones” in the world’s oceans and seas, highlighting that, although yet unknown, the consequences associated with these oxygen-depleted areas are predicted to be significant on a global scale. Excess of nitrogen from agricultural fertilizers, vehicle fumes, factory emissions, and wastes are the causes of the dead zones where marine creatures do not have enough oxygen to survive. "What is clear is that unless urgent action is taken to tackle the sources of the problem, it is likely to escalate rapidly,” said former UNEP Executive Director Klaus Toepfer.

The Forum also launched the Global Environment Outlook Year Book 2003, the first yearbook in the annual series associated with UNEP's flagship report, Global Environment Outlook (GEO). The report highlights major global and regional environmental events and achievements during 2003; has a chapter dedicated to freshwater in its role in achieving the Millennium Goals; ‘Emerging Challenges - New Findings’; raises awareness on emerging issues and new scientific research that ‘may assist society in recognizing and better understanding emerging environmental issues and help decision makers in designing adequate responses’ (http://www.unep.org/geo/yearbook/086.htm); and features GEO indicators for some of the key global and regional environmental issues and trends identified in GEO reports (including Ratification of Selected Agreements: http://www.unep.org/geo/yearbook/110.htm.) (March 2004) Ref.1091

Improved Cooperation among International Organizations to Fight Marine Pollution

The fight against marine pollution gained strength with the signing of a Memorandum of Understanding between the Secretariat of the Basel Convention on the Control of Transboundary
Movements of Hazardous Wastes and Their Disposal, and the UNEP Regional Seas Programme. The effort is designed to implement environmentally sound management of hazardous wastes in order to prevent coastal and marine pollution. It is based on collaboration of the 13 Basel Convention Regional Centres (BCRCs) with the various Regional Seas Programmes, and reciprocal technical and legal training support. [The Basel Convention regulates the movement of hazardous waste; it covers toxic, poisonous, explosive, corrosive, flammable, ecotoxic, and infectious wastes that are being moved from one country to another.]

IMO Secretary-General Efthimios E. Mitropoulos and the European Commissioner responsible for the environment, Stavros Dimas, also had a meeting this month focusing on better collaboration between the two organizations to enhance marine environmental protection from pollution from ships and related activities. They agreed on the need for ratification, by as many States as possible, of the newest IMO conventions such as the Ballast Water Management Convention and the Convention on Anti-fouling Systems, to enable them to come into force soon.

The amendments to the MARPOL Convention—including the revised phase-out schedule for single-hull tankers and a new regulation on the carriage of heavy grades of oil—will enter into force on April 5, 2005; and, on May 19, 2005, Annex VI of MARPOL on regulations for the prevention of air pollution from ships will be effective. (March 2005) Ref. 1092

Could large-scale ocean zoning prevent conflicts?
Increasing numbers of environmental lawyers and environmentalists believe that future conflicts could be prevented by large-scale ocean zoning for oil, fishing and wind farms, as well as that there is an immediate need for regulations to protect the oceans' natural resources. “We’re now able to do on the open ocean what we once did on our western frontier—eradicate the wildlife, extract the minerals and alter or pollute the habitat,” says David Helvarg, president of the Blue Frontier Campaign. Many variations of coastal zoning have been established around the world, which may one day lead to new large-scale ocean zoning within a more comprehensive integrated planning mechanism for local, regional and international standards and regulations for ‘pro-active rather than re-active’ ocean management. (March 2005) Ref.1093

Maritime Worker Security
The necessary ratifications have been received for the Seafarers’ Identity Documents Convention (Revised) (ILO-185) to go into force on 9 February 2005. ILO-185 will set international standards for seafarer identification documents (“SID”) that will provide reliable, positively verifiable, and internationally recognized identification and be acceptable in lieu of a visa for purposes of shore leave. This agreement will ease the enforcement of treaties for protection of the maritime environment against attack. (August 2004) Ref.1094

U.S. Commission on Ocean Policy Emphasizes Ecosystem-Based Management
A preliminary report by the U.S. Commission on Ocean Policy released on April 20, 2004 recommends changing the current fragmented system for managing oceans and coastal areas to an ecosystem-based management approach. For a new, coordinated, and comprehensive national ocean policy within the federal government, the Commission proposes a three-phase plan, and establishing a National Ocean Council (NOC) within the Executive Office of the President. (April 2004) Ref.1095
Europe to Harmonize Marine Pollution Legislation
Regulations on marine pollution from ships will be harmonized for all 25 EU member states. The new Directive, considers pollution discharging from ships in coastal waters or the high seas a crime, whether by intention or by negligence. The European Council of Ministers was expected to adopt legislation this month that defines both marine pollution crimes and harmonizes the level of penalties. However, these were not yet adopted at the time of this writing. Penalties for these crimes will be much higher than current fines. Enforcement will be through countries’ collaboration in identifying pollution cases and synergies among enforcement authorities, including national coast guards and criminal justice organizations. (July 2005) Ref. 1096

Europe looks to Maritime Rules after tanker spill
The breakup of the oil tanker "Prestige" spilling over a million gallons of oil into the ocean and polluting 124 miles of the Spanish coast prompted the European Commission to place the issue of oil tankers in EU waters on the agenda for the Maritime Transport Council Meeting on December 6. Until the oil tankers’ design, navigation, and maintenance improves, and regulations about sea routes change, such disasters are expected to continue. In cooperation with the International Maritime Organization the World Wildlife Fund has suggested a series of steps including the designation of particularly sensitive and vulnerable sea areas, tanker design, improved maintenance and inspection of all vessels, and limited routes for the ships carrying dangerous and toxic material. It is reasonable to expect that some of these recommendations will find their way into future international treaties. (November 2002) Ref.:1097

International Maritime Organization (IMO) and EU collaborate on oil spill prevention
Following the shipwreck of the oil tanker “Prestige” off the coast of Spain in November last year, recommendations for new regulations regarding oil tankers may become part of future international treaties. Leaders of the European Union (EU) and the International Maritime Organization (IMO) met on March 5 and agreed that the IMO should lead in establishing new measures concerning maritime safety while the EU would play a supporting role. The IMO has published a list of 66 ships that could be banned from EU waters. Meanwhile, the EU will propose to the IMO measures for phasing out single-hulled tankers. (March 2003) Ref.: 1098

Transport Canada Proposes New Vessel Operation Regulations
The Canadian Ministry of Transport, Infrastructure and Communities is proposing Vessel Operation Restriction Regulations as part of the Canada Shipping Act 2001 (CSA 2001), which came into effect on July 1, 2007. The new regulation will replace the existing Boating Restriction Regulations and includes restrictions on boating activities and navigation in Canadian waters as to type or speed of vessels, mode of propulsion and engine power, and access by vessels to specific areas. A 60-day comments period began on August 18, 2007, after the publication of the proposed regulations in the Canada Gazette. After consideration of all comments received, Transport Canada will finalize the regulations and publish them in the Canada Gazette, Part II, at which time they will come into effect. (August 2007) Ref.1099

The U.S. Might Ratify the Law of the Sea
This month [November 2004] marked the tenth anniversary of the entry into force of the Law of the Sea. There are indications that the U.S. Senate is now ready to agree to the U.S. ratifying the law in order to keep its important place at the table of negotiations. (November 2004) Ref. 1100
Malacca Straits Need Increased Protection from Various Security Threats
The Malacca Strait, one of the most important shipping lanes in the world, faces many challenges, including piracy, terrorists’ attacks and environmental degradation. If terrorists were to sink a ship at the shallowest part of the strait, no ship could pass through, and all traffic would be blocked. At the same time, increased traffic volumes add pressures to the ecosystem of the straits. In an address jointly hosted by the embassy of Malaysia and the Institute of Foreign Affairs and National Security, the Hon Dato' Sri Najib Tun Abdul Razak, Deputy Prime Minister of Malaysia, urged the need for united efforts by all users of the straits to address these challenges. (March 2007) Ref. 1101

Network of Marine Educators Formed to Protect Pacific
According to Environmental News Network, the International Pacific Marine Educators Conference (IPMEC), held 15-18 January 2007, in Honolulu, "has resulted in the establishment of a Pacific network of marine educators designed to ensure the health of the Pacific and the communities that depend upon it. The network aims to facilitate real action in marine education and highlight the need for ocean stewardship across the Pacific." (February 2007) Ref. 1102

Website for Marine Protected Areas and Cetaceans’ Sanctuaries
A new website, cetaceanhabitat.org, sponsored by the Whale and Dolphin Conservation Society, provides comprehensive information on the nearly 600 proposed and existing marine protected areas and sanctuaries for cetaceans. It has summaries and links to international treaties on MPAs; definitions of key MPA terms; updated news on proposals for new MPAs, and other related resources. (March 2007) Ref. 1103

Network of Marine Protection Areas to be Adopted by 2012
The establishment of a network of marine parks to protect the world's oceans from growing pollution and marine environment devastation was proposed at the First International Marine Protected Areas Congress held in Geelong, Australia 23-28 October 2005, In the Conference opening speech, Achim Steiner, director-general of the World Conservation Union (IUCN) emphasized that although there is rising concern and scientific evidence about marine environmental degradation, less than one percent of it is under protection today. He suggested establishing a system of Marine Protected Areas (MPAs) as decided at the 2002 World Summit on Sustainable Development. The MPAs would be designed by 2008 through collaboration of all concerned parties—international organizations, sovereign states, fishery organizations, and conservationists, for adoption by world governments by 2012. [See also Marine Protection Issues in the March 2005 environmental security scanning report.] (October 2005) Ref. 1104

New Baltic Sea Action Plan Based on Ecosystem Approach
The kick-off Stakeholder Conference of the Helsinki Commission approved the first steps in drafting the Baltic Sea Action Plan (BSAP) to protect and restore the Baltic Sea marine environment. The Plan includes intergovernmental cooperation among the countries bordering the sea—Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. The BSAP will be part of the new EU Marine Strategy for a healthy marine environment. “The BSAP will apply the ecosystem-based approach to management of the Baltic Sea. In setting a definition of ‘good ecological status’ for the Baltic Sea, as well as
specific environmental targets and necessary measures, the BSAP will be instrumental to the successful implementation of the [EU Marine] Strategy in the region,” said Peter Gammeltoft, Head of the Water and Marine Unit in the Directorate General for Environment at the European Commission. The Plan is expected to be adopted in late 2007. (March 2006) Ref. 1105

Baltic Ministers Recommend Additions to Baltic Sea Action Plan
The meeting of the environment ministers of the Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden), held in Finland at the end of August, focused on the condition of the Baltic, the Nordic countries’ actions on climate change, and the future of international environment management (including the Nordic initiative to strengthen UNEP.) The ministers called for tangible measures to protect the Baltic Sea (e.g., a ceiling on emissions of nutrients) and their inclusion in the Baltic Sea Action Plan (BSAP) due to be approved by the Baltic nations environment ministers at the meeting of the Helsinki Commission for the Protection of the Baltic Sea Environment (HELCOM) to be held on November 15, in Krakow, Poland. (September 2007) Ref.1106

Whales’ Protection Efforts Increasing
Transport Canada, Environment Canada, and a group of marine mammal researchers submitted a proposal to the IMO calling for diversion of large vessels in the Roseway Basin (southwest of Nova Scotia) to protect the endangered North Atlantic right whale. Several right whales are killed annually by collisions with large ships. The ban would prohibit shipping traffic in a 1,780 square kilometer area around Roseway Basin. Also to protect the North Atlantic right whale, the U.S. Fisheries Service proposed speed limits on the east coast. Similarly, a petition by the U.S. Center for Biological Diversity calls upon the National Marine Fisheries Service to protect endangered blue whales by setting a speed limit of 10 knots in the Santa Barbara Channel (California) for vessels 65 feet or larger while whales are in the area. (September 2007) Ref.1107

The U.S. National Marine Fisheries Service has released its recovery plan for Puget Sound's endangered killer whales. The plan covers about 2,500 square miles, including the waters around the San Juan Islands, the Strait of Juan de Fuca and all of Puget Sound. One of its aspects includes assessing and improving vessel traffic guidelines in and around protected areas.

Japan continues its whaling in waters off a section of Antarctica that Australia declared a whale sanctuary and over which it claims sovereignty. In January, an Australian Federal Court declared that whaling in the sanctuary was illegal and should stop. Australia’s new Prime Minister, Kevin Rudd, also calls for an end to whaling and New Zealand Prime Minister Helen Clark warned that photos of the Japanese whaling fleet revealing their location would be published if they entered New Zealand’s Antarctic waters.

A Pew Whale Symposium, entitled “A change in climate for whales,” was held at UNU Headquarters in Tokyo, Japan, January 30-31, 2008, as a prelude to an intersessional meeting on strengthening the International Whaling Commission, to be held March 6-8, 2008, in London. [See also Shipping Regulations for Protecting Whales in September 2007, New Marine Protected Areas Proposed in March 2007, Commercial Whaling Ban Strengthened by International Whaling Commission (IWC) in June 2007, and other items on similar issues in previous monthly reports.] (January 2008) Ref.1108

Coalition Urges UN to Consider Legislation to Curb Harmful Ocean Sounds
The Ocean Noise Coalition urges the international community to pass regulations to curb
harmful sound waves used by the oil and gas industry, and navies to detect submarines. Marine scientists state that there is increased evidence that these sounds are harmful to whales, dolphins and other marine life. The Coalition aimed to convince delegates from 148 nations to take action on the issue during their forthcoming consultations on oceans and marine law. [See also Scientific Models Could Help Navy Avoid Whales During Sonar Tests in February 2005, European Parliament Resolution to Protect Whales From Sonar in October 2004, and Research Confirms Military and Industry Sonar Harms Whales of July 2004 environmental security reports.] (June 2005) Ref. 1109

Measures Needed to Quiet Underwater Noise
The UNEP Convention on Migratory Species conference held in Rome noted that human activities are making the marine environment noisier, as well as more acidic. The report Ocean Noise: Turn it Down by the International Fund for Animal Welfare states that low frequency underwater noise has doubled every 10 years over the past 50 years, and the number of ships has tripled and is expected to double again by 2025. An alliance of wildlife groups warned that this is disturbing marine mammals that use sound to communicate and navigate and called upon governments to adopt regulations that impose quieter off-shore equipment and ship engines and less intrusive sonar technologies by navies. The EU submitted a draft resolution suggesting a wide range of measures, including noise protection areas, better monitoring of noise levels, databases with noise origins, and a set of guidelines for better managing noise sources.

In the meantime, a three-year lawsuit against the U.S. Navy by environmental groups concerning the Navy’s use of sonar in oceans has been settled in a California court, requiring more extended research on the effects of sonar on whales and other marine mammals. (Note: this is a separate case from the November 2008 U.S. Supreme Court ruling that lifts restrictions on the Navy’s use of sonar off the coast of California.) [See also U.S. Supreme Court Rules in Favor of Navy in Sonar Case in November 2008 and other previous environmental security reports on this issue.] (December 2008) Ref. 1110

UNU Report Urges the Need For a New Treaty on Deep-Sea Research
A new international treaty is needed to regulate the search for new products from species in deep international waters, the Institute for Advanced Studies of the United Nations University warns in a report. Compounds found in marine organisms can be used in medicines, and commercial exploration lured by potential profits threatens unique deep-sea ecosystem. The report urges the need for a new treaty to regulate exploitation so that benefits from the research are shared fairly and helps humanity as a whole. [See also Could large-scale ocean zoning prevent conflicts? of March 2005 environmental security monthly report.] (June 2005) Ref. 1111

Greenpeace Calls for Oceans Natural Reserves
A new report by Greenpeace, Roadmap to Recovery: A global network of marine reserves, is a comprehensive assessment of the present status of the high seas and threats to them, suggesting that 40% of the world's oceans should be declared natural reserves and protected in the same way as land areas are (according to UN data, at present just 0.6% of the oceans are protected compared with 12% of the world's land). The report outlines a global marine reserve network for the high seas, documenting why it is needed, investigating candidate sites for protection, and indicating some principles of marine reserve networking, as well as suggesting implementation strategies. (March 2006) Ref. 1112
Plastic Threats to the Marine Environment
Researchers are increasingly warning of the long-term threat from plastic waste to the marine environment as studies confirm the risks from hidden contamination. While most attention is focused on dangers that visible items of plastic waste pose to wildlife, new researches investigate the impact of underwater microscopic plastic fragments on tiny marine organisms. Researchers note that all continents experience plastic contamination and plastic particles could represent as much as one-quarter of the total weight of sandy material samples gathered on shorelines at the high tide mark. [See also The Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter Enters into Force in March 2006 and other previous environmental security reports on similar issues.] (March 2008) Ref.1113

Chemical and Biological Safety

Cartagena Protocol on Biosafety—Second Working Group on Liability and Redress
The second meeting of the international working group on liability and redress in the context of the Cartagena Protocol on Biosafety, held February 20–24, 2006 in Montreal, Canada, discussed the issues of damage caused by trans-boundary movements of living modified organisms and further considered options available for liability and redress. Specific talks focused on options for elements of rules and procedures as referred to in Article 27 - Liability and Redress. The discussions included definition of damage, effectiveness criteria, functional scope, clear rules on burden of proof and standing, and rules and procedure on compensation beyond national jurisdiction. Although no agreement was reached on any of the substantive issues, the final report acknowledges progress in mapping out the issues and in articulating their underlying legal rationales. There are presently 132 Parties to the Cartagena Protocol on Biosafety; the U.S. is neither Party, nor signatory. [See also The First Meeting of the Conference of the Parties to the Cartagena Protocol on Biosafety (COP MOP 1) in February 2004 environmental security report] (February 2006) Ref. 1115

Biotechnology Risk in Africa
Advancing developments in biosciences in Africa raise the risks of their potential misuse, thus increasing the need to develop adequate mechanisms for preventing the development and spread of biological weapons. For raising awareness on biosecurity issues and discussing the development of strategies that would encourage biotechnology research without jeopardizing security, a series of workshops were held—notably in Kenya and Uganda, two emerging biotech nations that are not yet properly engaged in international biosecurity policy deliberations. It was emphasized that Africa has to develop its own strategy, adapted to its own specific needs and conditions to reduce the risk of misuse, as well as to mitigate the damage to African scientific development in case of the use of biotechnology for harmful purposes. Africa should also develop a stronger position on regulatory issues and get more engaged in international negotiations related to biosecurity. [See also ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations in January 2007 and other environmental security reports on the same issue.] (August 2007) Ref.1116
Bioviolence; Preventing Biological Terror and Crime

Bioviolence: Preventing Biological Terror and Crime, by Barry Kellman is a very well written and documented analysis of the increasing threat of bioterrorism. He argues that the international community is not prepared to counter these dangers, and makes many recommendations that are carefully explained, including strengthening international law. (October 2007) Ref.1117

Middle East Biosecurity Assessment

Experts from more than 30 countries from the Middle East, Europe, and Asia addressed biosecurity-related issues in the Middle East and produced an initial assessment of the region’s biological defense capabilities. The three-day ‘Seminar for the Life Sciences and Policy Communities in the Gulf and Middle East and North Africa (MENA),’ held November 12-14 in Abu Dhabi, was organized by the International Council for the Life Sciences in collaboration with the Environment Agency of Abu Dhabi. It examined biological risks and threats in the conditions of the region’s growing biotechnology capabilities and its special security vulnerability. The issue was addressed in its whole complexity from possible causes, to necessary security measures, as well as preparedness in case of natural outbreak, accidental release of laboratory pathogens, or bioterrorism. Participants agreed that international collaboration and developing global standards and codes of conduct are essential in order to address biological risks and threats. An experts’ panel will continue working on Middle East biosecurity issues, and eventually a regional training center for specialists will be created. [See also ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations in January 2007 and other items in previous environmental security reports on this theme.] (November 2007) Ref.1118

Recommendations for the Biological Weapons Convention and other International Mechanisms to Prevent Terrorists from Getting Pathogens (at the International Symposium on Securing High Consequence Pathogens and Toxins, Sandia National Laboratories)

More than 60 bioscience experts from around the world gathered at the International Symposium on Securing High Consequence Pathogens and Toxins, Feb. 1-6, at Albuquerque Sandia National Laboratories to discuss securing pathogens and toxins from terrorists. The goal of the symposium was to share information and begin dialogue in the view of establishing international biosecurity measures and standards and protocols that would lead to improved security of facilities conducting infectious disease research worldwide. “Although most international bioscience labs have systems in place to prevent people from being accidentally exposed to infectious diseases, no international guidelines exist that specify how labs should prevent malicious theft or sabotage of biological materials,” says Sandia technical host Ren Salerno. He also recommended “biosecurity measures and standards be adopted and considered as national implementation policy for the Biological Weapons Convention.” (Also see the Millennium Project Environmental Security Scanning December 2003 report Item 1. International Agreement Needed to Insure Laboratory Bio-safety.) (February 2004) Ref.1119

Dangers Increase from “Amateur” Genetic Engineering; the Biological Weapons Convention to be Updated

Scientists from the Vanderbilt Medical Center and the University of North Carolina at Chapel Hill have used genetic engineering techniques to produce a new SARS-like virus affecting bats and transmittable to mice, in order to study such transferences. Some scientists believe these
kinds of experiments might trigger new biosecurity problems. “Garage” bioengineering development (“synthetic biology”) could be done by amateur scientists. The required knowledge is now widely available and affordable equipment is easy to obtain. So far no instances of terrorists exploiting this field have been reported. Another possibility is the accidental release of harmful new organisms into the environment by well-intentioned amateur experimenters. In the meantime, the annual session of States parties to the Biological Weapons Convention reiterated the need to improve biosafety and biosecurity, increase awareness, and develop codes of conduct for preventing the misuse of bioscience and biotechnology research. The Convention may be updated at the next review conference to be held in 2011 to cover potential new threats. After the meeting, Russia announced that it backs a legally binding mechanism for enforcing the Biological Weapons Convention. [See also ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations in January 2007 and other items in previous environmental security reports on this theme.] (December 2008) Ref. 1120

ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations
An ETC Group report, Extreme Genetic Engineering: An Introduction to Synthetic Biology, covers five major areas of research in synthetic biology: making minimal microbes; assembly line DNA; building artificial cells from the bottom up; and pathway engineering and expanding earth’s genetic system. The report looks at implications for trade, a synthetic energy agenda, intellectual property, the politics of biodiversity, and it warns, “today’s synbio industry has made the work of bioweaponeers a whole lot easier.” It looks at ‘synthetic governance’ and gives some recommendations including the need for establishing an international body to monitor and assess societal impacts of emerging technologies—including synthetic biology—to facilitate coordinated global action, and the fact that “building blocks of life” shouldn’t be privatized. The ETC Group presented the report and its recommendations at the World Social Forum held in Nairobi, Kenya, January 20-25.

Note: In September 2006, the European Commission 6th Framework Programme, NEST–New and Emerging Science and Technology published the report Synbiology: An Analysis of Synthetic Biology Research in Europe and North America, which is a synthesis of “1100 papers connected to the Synthetic Biology field in peer-reviewed journals published since 1990.” (January 2007) Ref. 1121

Chemical Weapons Convention Annual Conference
The ninth annual Conference of the States Parties to the Chemical Weapons Convention (CWC) was held in The Hague, from 29 November to 3 December 2004, to re-enforce efforts to eliminate chemical weapons and their production facilities. Although this was the largest meeting thus far and countries representing 90% of the world’s chemical industry are States Party to the Convention, some States of concern remain outside its control. An interesting precedent was created when Libya’s request was approved to convert chemical weapons production facilities into a pharmaceuticals plant to produce low-cost treatments for AIDS/HIV, malaria and tuberculosis for the African market. The Chinese representative called on Japan to get rid of the chemical weapons it left in China during World War II. She noted that 2000 Chinese casualties were caused by these weapons since the end of the War, underlining the need to make the Convention more effective and timely for the destruction of such weapons, as well as creating the relevant facilities for preventing chemical weapons proliferation and acts of chemical terrorism. (December 2004) Ref. 1122
Call for Reinforcements to Chemical Safety
At the Fifth Session of the Intergovernmental Forum on Chemical Safety, held 25-29 September 2006 at Budapest, Hungary, policymakers and experts reinforced the need for applying the precautionary principle in the context of chemical safety; extending globally the regulations on heavy metals; and tackling the widening gaps among countries in following chemical safety policies. Prior to the Session, a side event was held on health and environmental concerns associated with heavy metals and global needs for further action. [See also Stockholm Convention Updates in November 2005, First Conference of the Parties to Rotterdam Convention in September 2004, New Strategy for International Chemicals Management Launched in November 2003, and other related items in previous environmental security scanning reports.] (September 2006) Ref.1123

New International Strategy for Chemicals Management and 9th Special Session of the UNEP Governing Council
The International Conference on Chemicals Management (ICCM) focused on safe handling of chemicals in order to minimize adverse effects on human health and the environment by improving the production, trade, transportation, and storage of chemicals worldwide. The large number of chemicals already on the market, and the expected 80% growth over the next 15 years, has made it impractical to deal with separate regulations for individual compounds or groups of chemicals. As a result, the Conference adopted the Strategic Approach for International Chemicals Management (SAICM), a voluntary and comprehensive framework of measures pertaining to risk assessment, labeling, and stockpiling of chemicals, as well as handling of obsolete products. It also covers capacity building and staff training—primarily in the developing countries—in chemicals safety issues such as spills and accidents. UNEP will house the SAICM secretariat. The conference was held in Dubai, United Arab Emirates, from 4-6 February 2006, prior to the 9th Special Session of the UNEP Governing Council and Global Ministerial Environment Forum, which formally approved the SAICM.

The 9th Special Session of the Governing Council and Global Ministerial Environment Forum discussed strengthening international environmental governance, including transforming UNEP into a United Nations Environment Organization (UNEO) and the proposal to introduce universal membership of the Governing Council. No agreement was reached, but negotiations are expected at the next meeting. Other issues included environmental aspects of energy, tourism, and chemicals; assessment, monitoring and early warning; and revitalization of the Environmental Management Group. (February 2006) Ref. 1124

Micro-reactors Challenge Chemical Weapons Convention Effectiveness
A paper by Tuan Nguyen of the Lawrence Livermore National Laboratory calls attention to the erosion in effectiveness of the Chemical Weapons Convention caused by the advent of micro-reactors in the chemical industry. These devices, with sizes from a credit card to a notebook, replace large batch reaction vessels and make it much more difficult to monitor and verify compliance with the Chemical Weapons Convention. Hydrogen cyanide, phosgene, and methyl isocyanate have already been produced using this system, according to Nguyen. He also points out that chemical weapon precursors could be synthesized rather than purchased, making it more difficult to track down and discover the preparation of chemical weapons. (August 2005) Ref.1125
International agreement needed to insure laboratory bio-safety and uniformity in biosafety standards and application or compliance requirements

Although the fastest and most extensive medical coordination in history - lead by the World Health Organization - stopped human-to-human spread of SARS, an additional approach will be needed to make sure it does not return. Two new cases (one in Singapore in September and the other in Taiwan in December) have been traced to laboratory practices, which may have caused the infections. Hence, lack of global standards, monitoring, and enforcement, could prove a new source of health threats. Although many laboratory biosafety standards exist, there is no international treaty governing their usage. The US CDC (Centers for Disease Control and Prevention) and NIH (National Institutes of Health) publish the Biosafety in Microbiological and Biomedical Laboratories (BMBL) manual, which is generally considered to be the international “gold standard”. Even the WHO (World Health Organization) Laboratory Biosafety Manual follows many of the BMBL standards. While many countries use these biosafety standards, there is no uniformity of application or compliance requirement. (Unlike in the nuclear and chemical sectors that regulate the use and transport of radioactive and hazardous materials in the US, the BMBL standards are considered advisory, not regulatory, standards.) (December 2003) Ref.1126

New Strategic Approach to International Chemicals Management (SAICM) launched to address the widening gap among countries in following chemical safety policies

The Strategic Approach to International Chemicals Management (SAICM) was launched at the first session of the Preparatory Committee (PrepCom1) that took place in Bangkok, Thailand. The delegates discussed potential issues to be addressed by the SAICM, and its relation to existing chemicals-related agreements and debated whether or not the SAICM should be just a political statement and not encompass legally binding agreements. Other issues discussed included: monitoring of progress; prioritization of issues; dissemination of information; the precautionary approach/principle; corporate liability and accountability; and the role of science in risk assessments. It was generally agreed that the SAICM’s objectives should be linked to the World Summit on Sustainable Development (WSSD) target for 2020 and that it should address the widening gap among countries in following chemical safety policies. (November 2003) Ref.1127

New Chemicals Considered for Toxic Lists

Health Canada and Environment Canada are recommending adding diethyl sulphate to the country’s list of toxic substances. The compound is used in the production of fabric softeners, flocculants, pharmaceuticals, fragrances, and dyes. Various foreign jurisdictions, including the European Commission, consider it a possible carcinogen. The agencies also designated butane and isobutane for further assessment.

Concerns over the use of formaldehyde in pressed-wood products are getting increased attention. California issued new rules on these products, and the EPA published an Advance Notice of Proposed Rulemaking.

An investigation by CDC is underway to determine if antimony in fire-resistant clothing is posing a health risk. The issue was triggered by complaints in the Boca Raton FL Fire Dept.

The European Parliament voted to prohibit around 22 substances used in pesticides due to their potential health hazards. Two separate bills address the issue: one banning the very hazardous substances from pesticides and another considering use reduction of all pesticides. Three transborder geographical regions within the EU—rather than countries—can rule on the use of specific products, while countries can ban a product because of specific environment or...
agricultural circumstances. (January 2009) Ref. 1128

Stockholm Convention on POPs to be expanded

Stockholm Convention on Persistent Organic Pollutants Is Succeeding in Europe
A recent study has evaluated the effectiveness of the Convention on Long-range Transboundary
Air Pollution (LRTAP) in the UN Economic Commission for Europe countries, excluding
Canada and the US. The research revealed that many persistent organic pollutants (POPs)
decreased considerably and will continue to decrease as the LRTAP POP protocol is becoming
fully implemented by all countries. These results are significant for the global Stockholm
Convention on Persistent Organic Pollutants and for developing a global monitoring plan for
POPs. The study also included preliminary assessments for eight “candidate” POPs
(Hexachlorobutadiene (HBU); Pentabromodiphenyl ether (PBDE); Pentachlorobenzene (PCBe);
Polychlorinated naftalenes (PCN); Pentachlorophenol (PCP); Endosulfan, Dicofol; and short
chain chlorinated paraffins (SCCPs)) which could be added to the POP list in the future. [See
also Stockholm Convention on POPs Adopts Evaluation but not Non-compliance Mechanisms
in May 2007, New Chemicals Proposed to be Added to Stockholm Convention on POPs in 2005,
and other related items in previous environmental security scanning reports.] (February 2008)
Ref. 1129

Stockholm Convention on POPs Adopts Evaluation but not Non-compliance Mechanisms
The third meeting of the Conference of the Parties (COP-3) to the Stockholm Convention on
Persistent Organic Pollutants (POPs) occurred April 30-May 4, 2007, in Dakar, Senegal, with
over 450 participants representing more than 180 governments and international and non-
governmental organizations. Twenty-two decisions were adopted, including: measures to reduce
or eliminate releases from wastes (integration with the Basel Convention for developing a
framework for environmentally sound waste disposal); guidelines on best available techniques
draft guidance on best environmental practices; improving the reporting system; evaluation
of implementation effectiveness through the Global Monitoring Programme (establishing a
coordination group formed of three representatives from each of the five UN regions); technical
assistance; and non-compliance (negotiations to continue and mechanisms to be considered for
COP-4). COP-4 will be held May 4-8, 2009, in Geneva, Switzerland. (May 2007) Ref. 1130

Stockholm Convention Meeting to Look at Concrete Actions and Policies
The Second Meeting of the Conference of the Parties to the Stockholm Convention (COP 2) on
Persistent Organic Pollutants (POPs) will be held in Geneva, May 1–5, 2006. Representatives of
Parties to the Convention will review progress and discuss specific activities, policies, and
investments at the national and community levels that would help POPs reduction. The
conference agenda includes: strengthening of a global monitoring network to track the levels of
POPs in the environment; technical assistance; non-compliance; liability; and the redress of
issues. Presently there are 12 POPs covered by the Convention and more chemicals are under
technical review and expected to be added to the list in coming years. [See also Stockholm
Convention Updates in November 2005 and other previous environmental security scanning
reports.] Note: we will report on the COP-2 outcomes in the May environmental security
scanning report. (April 2006) Ref. 1131
Stockholm Convention to be Updated
The first meeting of the Persistent Organic Pollutants Review Committee (POPRC), held in Geneva on 7-11 November 2005, determined that all five chemicals proposed for inclusion in the Convention (pentabromodiphenyl ether, chlordecone, hexabromobiphenyl, lindane, and PFOS) fulfilled the screening criteria as stipulated in Annex D of the Convention and also adopted a draft outline of the risk profile for the new POP candidates. The first meeting of the Expert Group on Best Available Techniques and Best Environmental Practices to comply with the Stockholm Convention will be held in Geneva, Switzerland, 28 November–2 December 2005. [See also Sweden Calls for World Ban on PFOS Chemical in June 2005, New Chemicals Proposed to be Added to Stockholm Convention on POPs in May 2005, and Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties in the April 2005 environmental security scanning reports.]

This month India has ratified the Stockholm Convention, considerably increasing environmental protection in that economically fast-growing Asian country. (November 2005) Ref. 1132

Sweden Calls for World Ban on PFOS Chemical
Sweden proposes a global ban on perfluorooctane sulfonate (PFOS), a chemical used by a number of industries including semiconductor makers, and which might be harmful to human and animal health. Sweden would propose the ban under the Stockholm Convention. Sweden hopes that if the approval of the regulation takes a long time, the scientific evidence will convince countries to take independent advance actions to phase out PFOS. [See also Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties in the April 2005, and 8.2 New Chemicals Proposed to be Added to Stockholm Convention on POPs in May 2005 environmental security scanning reports.] (June 2005) Ref. 1133

New Chemicals Proposed to be Added to Stockholm Convention on POPs
The Punta del Este meeting of the parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) established a POPs Review Committee that will be responsible for evaluating additional chemicals that can be added to the current list of 12. Four candidate chemicals were given to the Committee, whose first meeting will be held in Geneva later this year, with its recommendations forwarded to future annual meetings of the Conference of the Parties to the Convention. The four candidates for phaseout are: the flame retardant pentabromodiphenyl; the hexachlorocyclohexanes, including the pesticide lindane; the pesticide chlordecone; and the flame retardant hexabromobiphenyl. (May 2005)

The First Meeting of the Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) will be held in Punta del Este, Uruguay from 2-6 May, 2005 and is anticipated to be attended by 800 government officials and observers from 130 countries. The Conference is expected to establish a process for evaluating future POPs candidates to add to the list, and to discuss best policies and strategies for implementing the Convention’s requirements with Guidelines on Best Available Techniques and Environmental Practices. (April 2005) Ref. 1134

EU Ratified the Stockholm Convention and Proposes new POPs to be banned
EU ratified the Stockholm Convention that bans the use of POPs. The treaty entered into force
on May 17, 2004. So far it has been ratified by 83 countries, among them 13 EU member states. As Party to the Treaty, the European Commission says that it has already prepared a list of nine additional POPs to propose to be banned under the Convention. (November 2004) Ref. 1135

The European Union has proposed banning additional chemicals beyond those found on the Stockholm Convention’s list. The chemicals include: hexachlorobutadiene, octabromodiphenyl ether, pentachlorobenzene, polychlorinated napthalenes, short-chained chlorinated paraffins, pentabromodiphenyl ether, chlordecone, hexabromobifenylen, and hexachlorocyclohexane. (August 2004) Ref. 1136

Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties

The 2001 Stockholm Convention banning the most dangerous Persistent Organic Pollutants (POPs) came into force on May 17, 2004. The UN-backed treaty is banning hazardous pesticides, dioxins and polychlorinated biphenyls (PCBs), as part of the UN effort to eliminate the worst health-threatening pollutants. The twelve POPs covered so far by the Convention are: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, polychlorinated biphenols (PCBs), hexachlorobenzene, dioxins and furans. Many experts consider the "dirty dozen" list too short. The first Conference of the Parties to the Convention (COP 1) to be held in Punta del Este, Uruguay, in early 2005 will establish a committee for evaluating other potential chemicals and pesticides to be added to the list. The COP will also finalize guidelines for promoting “best environmental practices” and “best available techniques” that can reduce or eliminate releases of the most toxic POPs. (May 2004) Ref. 1137

Global Mercury Ban

UNEP Governing Council/Global Ministerial Forum 2007 Makes Progress on Global Mercury Ban

The negotiations for a global ban of mercury progressed at the GC-24/GMEF (UNEP Governing Council/Global Ministerial Forum). Although a legally binding treaty imposing clear targets on cutting mercury use worldwide was not adopted, it was agreed that over the next two years an ad hoc open-ended working group will study the options for enhanced voluntary measures and international legal instruments to phase out mercury use. The group will provide a progress report to GCSS-10/GMEF, and a final report to GC-25/GMEF, which will make a decision on the matter. (February 2007) Ref. 1139

EU Seeking Global Mercury Ban

Health and environmental NGOs launched on January 10, 2007, the campaign “Stay Healthy, Stop Mercury” calling on the EU to promote global control on mercury pollution. The EU is expected to raise the global mercury ban issue at next month’s UN Global Ministerial Environment Forum to be held in Nairobi, Kenya, February 5-9. (January 2007) Ref. 1140

Europe Proposes Ban on Mercury Exports

The European Commission has proposed legislation to ban all European Union exports of mercury starting in 2011, and the European Parliament has drafted a measure that would forbid its use in non-electrical measuring devices, with the exception of barometers and antique...
instruments. [See also Mercury Instruments May Be Banned in EU in February 2006, EU Sets 2011 Deadline to Ban Mercury Exports in June 2005, and Governments Call for Global Assessment and Control of Mercury Pollution in February 2005 environmental security reports.] (November 2006) Ref. 1141

Mercury Instruments May Be Banned in EU
The European Commission has proposed a ban on the use of mercury in new fever and room thermometers, barometers and blood pressure gauges because of the serious risk the heavy metal poses to human health. The proposition will go for further debate to the European Parliament and European Ministers. Specialized applications, in particular medical measuring devices, where adequate substitutes may not be available, would not be subject to the restriction. [See also Recycling Regulations in the EU in August 2005, EU Sets 2011 Deadline to Ban Mercury Exports in June 2005, and Governments Call for Global Assessment and Control of Mercury Pollution in February 2005 environmental security reports.] (February 2006) Ref. 1142

EU Sets 2011 Deadline to Ban Mercury Exports
EU Environment ministers decided to ban mercury exports by 2011. Europe is the world largest mercury exporter, supplying about one-third of global demand. It also proposed the phase-out of mercury in some products such as thermometers, and improved global efforts on mercury waste management. [See also Governments Call for Global Assessment and Control of Mercury Pollution in February 2005 environmental security report.] (June 2005) Ref. 1143

As part of the effort towards a legally binding treaty to control mercury pollution, environment ministers attending UNEP's 23rd Governing Council and Global Ministerial Environment Forum in Nairobi, Kenya, requested UNEP to conduct a study on the amounts of mercury being traded and supplied around the world. The EU called for a clear framework with bans and deadlines, but the Governing Council was not ready to go that far at this time and decided instead on a partnership formula. The first pilot partnership projects should begin by September. The program will be reviewed in two years and assessed to determine whether further action (including a legally binding treaty) is needed. Similar global assessments were suggested for cadmium and lead to better understand the health and environment effects of these heavy metals and establish whether global action is needed to address them. [See also Senators Urge U.S. Support for Global Mercury Treaty of October 2004, EU Parliamentary Committee Moves to Strengthen Air Pollution Laws of January 2004, and UN Protocol to Restrict Heavy Metal Emissions in Europe Came Into Force in December 2003 environmental security reports.]

Note: the EU Executive Commission recently proposed a ban on mercury exports by 2011. Europe is the world’s largest supplier of mercury. (February 2005) Ref. 1144

Senators Urge U.S. Support for Global Mercury Treaty
A bipartisan group of seven Senators introduced a resolution urging the U.S. to collaborate with international partners to prepare a comprehensive strategy for reducing global mercury pollution and mercury use. The Senators introducing the proposal include: Mark Dayton (D-MINN), Jim Jeffords (I-VT), Lincoln Chafee (R-RI), Paul Sarbanes (D-MD), Joe Lieberman (D-CT), Patrick Leahy (D-VT), and Frank Lautenberg (D-NJ). They suggest starting international negotiations for a binding international agreement to limit mercury use, trade, mining, and pollution, to be considered at the next UNEP Governing Council meeting in February 2005. (October 2004) Ref. 1145
**EU to Ban the use of Cadmium in Batteries**
As part of its effort for reducing environmental pollution from heavy metals, the EU has decided to ban the use of cadmium in consumer batteries. Cordless power tools, medical equipment, emergency lighting, and alarm systems are exempted so far, but in 2008 when the law will be reviewed, the European Commission might propose a complete ban—as previously suggested by such countries as Sweden and Denmark. The environmental ministers also set collection targets for portable batteries. After adapting their national legislation to the new EU regulations, in the first four years, 25% of all used batteries should be collected on their territories; while after eight years the rate rises to 45%. The new legislation is awaiting European Parliament approval. (December 2004) Ref. 1146

**Call for Global Ban on Lead-based Paints**
Scientists are calling for international regulations to ensure that paints have lower than critical lead levels, with the ultimate goal of eliminating all lead from paint. The call comes as a result of a study on consumer paint lead levels in Africa, conducted by a multinational team of environmental and occupational health researchers. Note: The Budapest Statement on Mercury, Lead and Cadmium adopted at the fifth session of the Intergovernmental Forum on Chemical Safety held in September 2006 invites the UNEP GC “to give high priority to considering [...] measures, as appropriate, on lead and cadmium, by assessing the need for further action and considering a range of options, including the possibility of establishing a legally binding instrument.” (October 2007) Ref.1147

**WHO Project to Minimize Risks of Radon**
The World Health Organization (WHO) is launching the International Radon Project to help countries reduce the health risks associated with radon gas. Radon, a radioactive gas emanating from soil, is estimated to be the cause of 6–15% of lung cancer cases. The first phase of the project is designed to run for three years, 2005–07. It will assess risk levels, and exposure measurements and guidelines. It will also increase public and political awareness about the consequences of exposure to radon. It will also identify and promote effective strategies and policies useful to countries for mitigating health impacts of radon. Radon is present worldwide, in air and water, but its concentration is highly dependent on the content of uranium in soil. (June 2005) Ref. 1148

**Reactive Nitrogen Beginning To Be Recognized As Environmental Hazard**
Two papers in the May 16 issue of *Science* discuss the problem of excessive reactive nitrogen in the environment. According to Univ. of Virginia environmental sciences professor James Galloway, “We are accumulating reactive nitrogen in the environment at alarming rates, and this may prove to be as serious as putting carbon dioxide in the atmosphere.” Atmospheric nitrogen can appear as nitric acid in water and vegetation or can contribute to the greenhouse effect. The International Nitrogen Initiative (www.initrogen.org) has been established to serve as a center for efforts to cope with this problem. [See also *New Predictions for the Atmosphere by 2030* in October 2006 environmental security report.] (May 2008) Ref.1149

**Methyl Bromide a Continuing International Concern**
The Green Party in New Zealand is calling for an immediate halt to methyl bromide fumigation
at Wellington’s port, after it was learned that the ozone-destroying chemical, regulated under the Montreal Protocol, was being used in the heart of the city. This action, together with the coming into force in January of Indonesia’s ban on its import, is likely to increase international attention to the hazards it presents and support for adherence to the Protocol. [See also Call for Expanding Montreal Protocol on Ozone-Depleting Substances in September 2007, and other similar items on this issue in previous environmental security reports.] (February 2008) Ref.1150

**Possible Risk with Bisphenol A Receiving Increased Attention**

Opinions continue to be divided on the environmental danger posed by bisphenol A, a chemical widely used to harden plastics. The NIH National Toxicology Program issued a controversial preliminary report citing minimal risk to adults, but another panel, led by Prof. Fred vom Saal of the Univ. of Missouri, expressed “a very high level of concern”, according to one of its members. An EPA spokeswoman has conceded that its 14-year-old safe level for the chemical is out of date, and says the agency is now studying it. Various studies around the world have not yet produced a clear indictment of the compound as a serious environmental hazard. (December 2007) Ref.1151

**Questions on Bisphenol A Risk Raised Again**

The Canadian health ministry is said to be ready to declare BPA a dangerous substance, and the US National Toxicology Program, part of the National Institutes of Health, has expressed concern over its effects on the very young. [See also Possible Risk with Bisphenol A Receiving Increased Attention in December 2007 environmental security report] (April 2008) Ref.1152

**Concerns Increasing for BPA Bans and Phthalates**

Canada has announced it would ban the use of bisphenol-A (BPA) in baby bottles, and the U.S. Safeway grocery chain will stop selling plastic baby bottles made with BPA. The U.S. National Toxicology Program and the FDA Science Board have recently indicated concern over the health safety of the chemical. Similarly, phthalates, used in a wide variety of products, are also beginning to be subjected to scrutiny for their effect on the genital development of male fetuses. (October 2008) Ref.1153

**Vanishing Supply of World's Helium Calls for Conservation**

The world's largest reserve of helium may be depleted in as short a time as eight years, experts say; they also point out that the gas is non-renewable and irreplaceable. It has a number of applications in science and technology, and in industry, e.g., nuclear magnetic resonance, mass spectroscopy, welding, fiber optics and computer microchip production. Helium is found in some natural gas reservoirs, and Russia may be a future supplier. Its separation from the atmosphere is prohibitively expensive. (January 2008) Ref.1154

**Canadian Chemical Plan May Go beyond REACH as Environmentalists Get New Political Support**

The Canadian government has launched a plan to regulate the use of chemicals harmful to human health and the environment. Although the initial plan targets only 200 chemicals for regulation over the next four years, more could be added to eventually go beyond initiatives in Europe and the U.S. The Canadian efforts to strengthen such environmental policies will be improved by election of Stéphane Dion (former Environmental Minister) this month as the
Liberal Opposition Leader. Sources report a rising environmental tide among the public. Previous negotiations for regulations mostly related to climate change, but pollutants are also expected to be revived as the Conservatives’ efforts in the environment arena are strongly criticized by the other parties, citizens, and the international community. [Note: This month, the Secretariat of the Commission for Environmental Cooperation (CEC, NAFTA’s “environmental arm”) issued a determination requesting a response from Canada to a submission asserting that Canada is failing to effectively enforce the federal Species at Risk Act.] (December 2006) Ref.1155

Canada Prepares to Ban More Chemicals
The government of Canada announced that it is preparing to issue a ban on a number of chemicals in common use in various applications, because of possible harm to human health or the environment. The 11 chemicals include vinyl acetate, ethylene oxide, thiourea, isoprene, and cyclohexasiloxanes. Industry has 60 days to offer countervailing evidence. [See also Questions on Bisphenol A Risk Raised Again in April 2008 environmental security report.] (May 2008) Ref.1156

Bottled Water Becomes Target of Environmentalists
Organizations around the world are becoming active in opposing the now rapidly increasing use of bottled water, and regulations and restrictions are beginning to be applied to its distribution. Shipping bottled water across the Atlantic and Pacific by oil-propelled ships does seem odd. One estimate puts the annual fossil fuel footprint of bottled water consumption in the United States at over 50 million barrels of oil equivalent—enough to run 3 million cars for one year. Beginning January 1, 2008 the city government of San Francisco has banned its departments and agencies from purchasing bottled water, and St. Louis is considering the same ban for its city employees in early 2008. With increased discourse around bottled water, it is likely that some international directives will be adopted to regulate its trade and distribution. (December 2007) Ref.1157

Greenhouse Gas Emissions

Post Kyoto Protocol Negotiations

The EU proposes that richer countries cut greenhouse gas emissions by 30% by 2020, and that developing countries (except the poorest) cut emissions to 15%-30% below “business as usual” levels. The proposal suggests setting up a carbon market for richer countries by 2015 and that poorer countries be included five years later. The proposal will be submitted for member states’ approval at a summit in March. An important shortfall is the lack of budget.

The McKinsey report Pathways to a low carbon economy addresses the feasibility and conditions to keep global warming within the 2°C limit. The report finds that it is possible to reduce GHG emissions “to stay on track until 2030” but immediate action and a strong policy framework are needed. Any delay might result in missing the 2°C limit.

At the World Economic Forum, BP Chief Executive Tony Hayward said that the world should establish a price for carbon emissions.

Delegates attending the Ministerial Conference on Transport held January 14-16, 2009, in Tokyo, called on the International Maritime Organization and International Civil Aviation Organization to prepare by the end of the year “a package of appropriate mechanisms for
reducing emissions,” from the aviation and shipping sectors. (January 2009) Ref. 1159

Over 11,000 participants from 190 nations attended the conference held in Poznan, Poland, December 1-12, 2008 to advance negotiations for a post-2012 climate change regime. Despite little progress on filling in the gap between rich countries’ rhetoric and real commitments for addressing climate change (partly due to the global financial conditions), procedural decisions were made and there were commitments from governments for negotiating an effective new UN climate treaty and response to climate change to be agreed at the Copenhagen meeting in December 2009. A first draft of the text would be presented at a UNFCCC conference to be held in June 2009, in Bonn. Also, UN Secretary-General Ban Ki-moon said that he is considering convening a summit focused on climate change at the time of the General Assembly in September 2009. While a few industrialized countries openly undermined progress, most developing countries came with clear and constructive proposals. Progress was made in the area of technology transfer with the endorsement of the Poznan Strategic Programme on Technology Transfer that aims to increase investments for mitigation and adaptation technologies in developing countries and in reducing greenhouse gas emissions from deforestation and forest degradation.

Hans Joachim Schellnhuber, head of the Potsdam Institute for Research on Global Warming Effects and adviser to German Chancellor Angela Merkel on climate-change issues, says that in order to avoid a disastrous climate change, global CO₂ emissions would need to be reduced 50% by 2050, meaning an 80%–90% decrease for industrial countries. (December 2008) Ref. 1160

In the preamble to the Poznan meeting to be held December 1-12 as part of negotiations for a post-2012 treaty, the UN released an analysis of greenhouse gas emissions, showing that of 40 industrialized countries that have greenhouse gas reporting obligations under the Kyoto Protocol 16 are on target, and 20 countries—including Canada, Germany, Ireland, Italy, Japan, New Zealand and Spain—are lagging. However, it notes, “the biggest recent increase in emissions of industrialized countries has come from economies in transition, which have seen a rise of 7.4% in greenhouse gas emissions within the 2000 to 2006 time-frame.” The report did not include large emerging economies like those of India and China.

Australia said that it will advocate that rich developed countries—such as Singapore and South Korea—be also included in any binding targets.

The “Algiers Declaration” by Africa’s 53 countries calls for the development of a common vision and to act as a bloc in the negotiations for the new global warming treaty. (November 2008) Ref. 1161

The WWF report Climate Change: faster, stronger, sooner calls on the EU to adopt an emission reduction target of at least 30% below 1990 levels by 2020 (compared to the present 20% target) in the EU territory, rather than by overseas offsetting. It also suggests stronger EU leadership at the international level for a post-2012 climate treaty and increased EU funding for developing countries to address climate change and adaptation.

Japan drafted a new post-Kyoto protocol to be submitted in December at the 14th Conference of the Parties to U.N. Framework Convention on Climate Change (COP14) (October 2008) Ref.1162

The Climate Change Review by Professor Ross Garnaut, commissioned by Australia’s
government, assesses what should be targets for cutting CO₂ emissions by the greatest emitting countries to respond to climate change. The report recommends the following targets: for Australia 80% for 2050 with a 10% interim by 2020; same for Canada; for the U.S. 81%, for Japan 75%, and the EU 69%. If considering emissions per capita, China should cut only 4%. The Australian Federal Treasury will release its emissions trading scheme economic model in October, while emissions trading legislation is expected to be introduced by the end of the year. (September 200) Ref. 1163

The third UN climate talks for a post-2012 treaty took place August 21-27 in Accra, Ghana, attended by about 1,600 delegates from some 160 nations. Progress was made on focus-issues such as strategies for slowing deforestation in developing nations, and considering a sectoral approach for greenhouse gas reduction targets. Rich countries insisted on a differentiation of approach and obligations of developing nations to greenhouse gas emissions based on their economic strength, pointing out that some developing nations such as Singapore, Argentina and some OPEC states have grown richer than some developed nations which have to comply with greenhouse gas emissions cut obligations. Rapidly industrializing countries have refused to accept the overall reduction targets that would be imposed on the rich nations, but progress was made in developing nations accepting targets for specific, highly polluting industries such as cement, steel, and aluminum. The conclusions will be compiled for further discussion at COP 14 in December 2008, in Poznan, Poland.

Some nations outside the Kyoto framework want to set binding targets for emissions and act as a bridge between the developing and developed nations. For example, South Korea wants to announce in 2009 its 2020 greenhouse gases targets. Japan announced plans to reduce total carbon emissions by up to 80% by 2050. In order to engage consumers in the “CO₂ reduction revolution,” carbon footprint labels will be put on most products’ packaging. (July-August 2008) Ref. 1164

The theme for World Environment Day 2008 was “Kick the Habit: Towards a Low Carbon Economy”, recognizing the need for a strategy to reduce greenhouse gas emissions from fossil fuel.

The group of 16 nations accounting for about 80% of the world’s CO₂ and other greenhouse gas emissions—G8 plus Australia, Brazil, China, India, Indonesia, Mexico, South Korea and South Africa—attending the Major Economies Meeting held in Seoul, failed to agree on clear targets to cut greenhouse gas emissions. The draft agreement mentions rather generic “deep cuts” based on the “ambitious” scenario outlined by the IPCC (although its target of 50% reduction by 2050 is not mentioned in the draft statement.) The statement is expected to be adopted at the July G8 summit to be held in Japan. Nevertheless, Yvo de Boer, head of the UN Framework Convention on Climate Change expressed hope and the urgency that the Japan G8 summit set clear emission targets for a post-2012 treaty.

The EIA International Energy Outlook 2008 looks at energy trends up to the year 2030, estimating global energy consumption will grow by 50% with 85% of that in non-OECD states. CO₂ emissions will likely increase by 51% (1.7% annually), with non-OECD states expected to exceed OECD members’ emissions by 72% in 2030.

Meantime, James Hansen of NASA warned again that the world has passed the “dangerous level” for greenhouse gases in the atmosphere and should cut to 1988 levels. He said “This is the last chance,” to avoid “changes such as mass extinction, ecosystem collapse and dramatic sea level rises.”
The German government approved a climate package—focusing mainly on the transport and construction sectors—designed to help reach by 2020 the target of reducing CO₂ emissions by 49% compared to 1990 levels. (June 2008) Ref.1165

Scientists at the Mauna Loa observatory in Hawaii found that the levels of CO₂ are at least 34% higher than pre-Industrial Revolution levels and near the suspected climate-tipping point of 400 ppm. They note that the rise was 2.14 ppm in 2007, while from 1970 to 2000 the concentration rose by an average of about 1.5 ppm each year.

“Present global mean CO₂, 385 ppm, is already in the dangerous zone” and “prompt policy changes” are needed, suggests the Target Atmospheric CO₂: Where Should Humanity Aim? paper by a group of scientists led by Jim Hansen, director of the NASA Goddard Institute for Space Studies. Based on an analysis of paleoclimate data and ongoing climate change, the authors argue that CO₂ should be reduced to a maximum of 350 ppm in order to avoid reaching irreversible tipping points and maintain the Earth conditions supporting life as we know it. The main policy suggestions include increasing efforts to find energy sources beyond fossil fuels, and ending fossil fuel exploitation and use without adequate CO₂ capture and sequestration. The ultimate task is phaseout over the next 20-25 years of coal plants that are not equipped with carbon sequestration technology. The paper admits that establishing a clear time frame of climate change is difficult, since the models are still deficient. Nevertheless, it underlines the urgency of the situation and concludes that although the task of curbing man-made CO₂ emission is difficult, it is “feasible when compared with the efforts that went into World War II.”

The State and Trends of the Carbon Market 2008 report of the World Bank shows that the global carbon market grew to $64 billion in 2007, more than double the 2006 level. The European Union Emission Trading Scheme (EU ETS) also saw a doubling of both value and number of allowances transacted. (May 2008) Ref.1166

Bali Roadmap Sets Framework for Post-Kyoto Negotiations
About 10,800 participants, including high-level delegations from 187 countries, attended the UN Climate Change Conference in Bali, Indonesia, December 3-15, 2007. The most significant result was the "Bali Action Plan", also called the Bali roadmap. It outlines a two-year agenda of negotiations for a post-2012 global climate regime to enter into force by 2013, but does not include emissions reduction targets, despite strong support by the EU and other countries. The roadmap calls for agreements by the end of 2009 at a major summit in Copenhagen. The agreement is to include both national and international mitigation and adaptation actions to address the effects of climate change, including methods to reduce greenhouse gas emissions, development and transfer of climate-friendly technologies, and financing and investment measures. Four major UNFCCC meetings to implement the Bali roadmap are planned for 2008.

Other results of the Bali Convention included the launch of the Kyoto Protocol’s Adaptation Fund to finance projects in developing countries; a Forest Carbon Partnership Facility, an addition of deforestation to a post-2012 treaty agenda; and other capacity-building, financial, administrative, and methodological issues. A consortium of mayors and local governments launched the World Mayors and Local Governments Climate Protection Agreement, with six commitments addressing climate change, including the reduction of carbon emissions by 60% to 80% worldwide by mid-century (cities account for 80% of humanity’s production of greenhouse gases). (December 2007) Ref.1167
The report *From Bali to Poznan: New Issues, New Challenges* summarizes the discussions and outcomes of the conference with the same name held at the European Parliament in Brussels, December 18, 2007, convened by the Institute for Environmental Security in cooperation with other interested organizations. It assesses the impact of climate change on international security and sustainable development, a switch to solar energy as an alternative to fossil fuels, implications of illegal trade in natural resources, and the ways climate change influences European foreign policy. The report can be seen as background policy information for the next UNCCC to be held in Poznan in December 1-12, 2008. (May 2008) Ref.1168

The two-day GLOBE forum (Global Legislators Organization for a Balanced Environment) was organized as a preamble to the G8 summit to be held in July. It was attended by about 100 lawmakers from the Group of Eight industrial countries (Britain, the United States, France, Germany, Italy, Russia, Canada and Japan) and fast-developing nations (China, Brazil, India, South Africa and Mexico). The main subjects were: discussing a draft post-Kyoto Protocol treaty, the need for G8 countries to intensify efforts to meet the Kyoto targets, and strategies to help developing nations improve practices for reducing emissions.

UN Secretary-General Ban Ki-moon’s message to the UNEP Global Ministerial Environment Forum called for a “decisive and deep regime for emissions reductions after 2012” and for the development of “financial incentives and mechanisms so markets can respond to the opportunities of a rising carbon price” under the guidance of the Bali roadmap. (February 2008) Ref.1169

The first meeting since the December Bali conference for negotiating a post-Kyoto climate change treaty is being held in Bangkok, March 31-April 4. It aims to move forward the Bali Roadmap. Key issues on the agenda include limiting greenhouse gas emissions, adaptation, mitigation, deployment of climate-friendly technologies, and financing. [Note: the meeting was ongoing at the time of this writing and the outcomes will be included in next month’s report.] It is hoped that negotiations will be concluded next year at a major Copenhagen summit.

Humanity lost an important decade of actions to curb global warming, because of protracted negotiations, noted Robert Watson, now chief scientific adviser at the U.K. environment ministry, and former chairman of the UN Intergovernmental Panel on Climate Change. He emphasized the swift need for a new treaty that would set more ambitious long-term goals for reducing greenhouse gas emissions in order to limit temperature rise to 2°C by the end of the century. Mr. Watson considers that the targets for developed countries should be 80% rather than the projected 60%, while for developing countries the allowed rise should be 60% rather than a projected 140%. He underlined that such goals imply the implementation of a mixture of technologies and increased technology transfer. (March 2008) Ref.1170

The first session of the working groups for negotiating a post-Kyoto treaty to address greenhouse gas emissions reductions took place from March 31 to April 4, 2008 in Bangkok, Thailand. Delegates from 163 countries participated. The main outcome is a work plan to advance the Bali roadmap. Many delegates proposed workshops on issues they wanted to be addressed by the new treaty. Generally, the discussions went well, the main disagreement area being the Japanese proposal on a “sectoral approach” for greenhouse gas emissions targets based on energy-efficiency standards by industry, and the concept of “measuring, reporting and verifying.” Seven more sessions will be held—three this year and four in 2009.
The next meeting will be held in June, in Bonn, addressing developing countries’ adaptation strategies and clean technology transfer. In-depth discussions of the Japanese proposal on greenhouse gas emissions and energy efficiency targets were postponed to the August meeting to be held in Ghana. China, India, and other developing countries strongly oppose the Japanese plan that would require developing countries to stabilize greenhouse gases over the next 10–15 years and cut them in half by 2050. Significant disagreements remain over demands from the U.S. and Japan for developing countries to accept binding targets as part of a pact to stabilize greenhouse gases in the next 10–15 years and cut them in half by 2050.

Aviation and shipping industries account for some 5%-8% of greenhouse gas emissions and are sectors not covered by the Kyoto Protocol, due to the difficulty in classifying them under individual nations. However, the European community estimates that emissions might grow by 32% from shipping and 90% from aviation. Therefore, Europe is advocating clear and meaningful greenhouse gas emission reduction targets for the two sectors. (April 2007) Ref.1171

Conferenes, reports

The climate change talks organized by the UN Framework Convention on Climate Change in Vienna, Austria, agreed that a global approach is crucial in tackling climate change and its effects, and prepared the way for further negotiations for a post-Kyoto treaty to be discussed at the December summit in Bali. Climate change and post-Kyoto strategies are also expected to top the agenda of the Asia Pacific Economic Cooperation (APEC) summit to be held on September 8. Meanwhile, the secretariat of the UNFCCC released first results indicating that countries will meet criteria to begin trading in Kyoto emission allowances for 2008, the first year of the Treaty’s first commitment period. (August 2007) Ref.1172

The UN's "The Future in our Hands: Addressing the Leadership Challenge of Climate Change", the largest-ever meeting of world leaders on climate change, was held on 24 September at the UN headquarters in New York, as a preamble to the UN high-level General Assembly, to set the stage for the December Bali negotiations on a post-Kyoto treaty to address climate change and GHG emissions. It addressed aspects related to adaptation, mitigation, technology, and financing. Participants agreed that a new treaty to address climate change was needed, and that the UNFCCC is the most appropriate forum to conduct the negotiations. Meanwhile, the number of lawsuits dealing with global warming is increasing around the world. Environmentalists are hoping to increase pressure on policymakers and companies to change to more environment-friendly and low-GHG emission policies. Initiatives such as the Carbon Disclosure Project (which sent letters to 2,400 large firms around the world) are demanding that corporations be more transparent and accountable in disclosing their GHG emissions and their activities’ impact on climate change. (September 2007) Ref.1173

As a prelude to the December Bali summit, environment ministers from about 40 nations held an informal meeting in Indonesia, agreeing that the world must finalize a climate change treaty by 2009, to leave enough time for countries to ratify it before the Kyoto Treaty expires in 2012. Countries key for the negotiations were represented in the meeting—low-lying countries such as the Maldives, OPEC such as Saudi Arabia, the U.S., Australia, China, and India. Also in preparation for the Bali Summit, in November the Government of Maldives will be hosting an
international conference, “The Human Dimension of Global Climate Change,” with the theme “Recognizing environmental security as a fundamental human right,” said Maldives President, Maumoon Abdul Gayoom.

*Contributions to accelerating atmospheric CO$_2$ growth from economic activity, carbon intensity, and efficiency of natural sinks*, a study conducted by the Global Carbon Project in cooperation with other research institutions, reports that increase in atmospheric CO$_2$ is due to faster economic growth coupled with slowing improvements in carbon intensity, and decreasing efficiency of natural sinks in removing emissions from human activities. The paper says that 2006 CO$_2$ releases were 35% above the 1990 level. “The longer we delay reducing emissions, the more restorative capacity will be lost,” added CSIRO scientist Dr Mike Raupach, co-chair of the Global Carbon Project. (October 2007) Ref.1174

The IPCC *Fourth Assessment Report (AR4) Summary for Policymakers* [see item above] is a fundamental document for policymakers in preparation for the UN Climate Change Conference to be held in Bali, Indonesia, 3-14 December 2007.

The "Singapore Declaration on Climate Change, Energy and the Environment" adopted at the East Asia Summit attended by leaders of 16 Asian nations, including China and India, pledges action on climate change and declares support of the UN plan as the “core mechanism” for tackling global warming, and commits to support efforts to negotiate an effective post-2012 international arrangement under the United Nations Framework Convention on Climate Change (UNFCCC) process. The same position emerged from the Asia Southeast Asian Nations – European Union (ASEAN-EU) United Summit, where delegates acknowledged that “developing countries should also play their part [in GHG emissions reduction], supported by developed countries through positive incentives, including through a strengthened global carbon market.” Government representatives attending the Alliance of Small Island States (AOSIS) discussed collaboration on coping with the devastating effects that climate change has on their nations, and on advancing the international negotiations for a comprehensive post-Kyoto Treaty during ‘The Human Dimension of Global Climate Change’ conference with the theme ‘Recognizing environmental security as a fundamental human right’. The Maldives President, Maumoon Abdul Gayoom, reiterated the importance of recognizing “environmental protection as a fundamental human right” and announced that the Maldives will initiate a debate on the issue with the Human Rights Council. (November 2007) Ref.1175

*Delivering Climate Security: International Security Responses to a Climate Changed World*, by Nick Mabey, published by Britain’s Royal United Services Institute for Defence and Security Studies, outlines a framework for climate security analysis and some of its implications for security policy, practice and institutional change. Noting that international response to climate security threats has been ‘slow and inadequate’, it recommends that nations integrate climate change into their security policy to prepare for worst-case scenarios. Otherwise, says the author, climate change might have security implications of “similar magnitude to the World Wars, but which will last for centuries.” (April 2007) Ref.1176

UN Climate Change Conference Explores Post-Kyoto Regulations
The twelfth Conference of the Parties (COP 12) to the UN Framework Convention on Climate Change and the second Meeting of the Parties to the Kyoto Protocol (COP/MOP 2), as well as some 130 related side events took place in Nairobi, Kenya, November 6-17, 2006, attended by
over 5,900 participants, including 2,300 government officials. The foci were on the future of the Protocol and the Convention, and longer-term action to combat climate change and cope with its consequences. The meetings resulted in the adoption of 10 COP decisions and 11 COP/MOP decisions and in the approval of a number of conclusions by the subsidiary bodies, but no agreements were reached on post-Kyoto cuts or a negotiations timetable. However, the governments recognized that there is compelling scientific evidence for global warming and thus global emissions need to be reduced 50% by 2050. At the insistence of the European Union, a thorough examination of the Protocol will take place in 2008. Important achievements include: a) establishment of the Least Developed Countries (LDC) Fund, Special Climate Change Fund (SCCF), and Adaptation Fund; b) launch of the Ad Hoc Working Group on Annex I future commitments; c) the Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention; and d) the assignment of high priority to adaptation activities, mainly in developing countries. It is expected that, at next year’s meeting, to be held in Indonesia, governments will start full negotiations for deeper cuts in emissions to keep the rise in global temperatures below the critical 2°C level. (November 2006) Ref. 1177

Moves Forward on the Post-Kyoto Negotiations

The European Environment Council agreed to significantly accelerate global negotiations for a post-Kyoto framework to reduce greenhouse gas emissions. It is ready to assume leadership for completing global negotiations by the end of 2009. (December 2006) Ref. 1178

Leaders attending the recent Heiligendamm (Germany) G8 summit agreed to seek “substantial” cuts in greenhouse gas emissions, and to launch negotiations at the December 2007 UN Summit for eventually reaching agreement on a new—more inclusive—UN-led treaty by 2009. EU, Canada, and Japan supported a target of a cut to 50% of the 1990 emissions level by 2050. (June 2007) Ref. 436

Denmark began preparing for the 2009 UN climate summit that it will host. However, it admits that reaching a political agreement on a new global climate treaty to replace the current Kyoto Protocol will not be easy. (June 2007) Ref. 436

 Ahead of the September Asia Pacific Economic Cooperation summit, Australia's Prime Minister John Howard is seeking to launch negotiations for an Asia-Pacific new climate agreement and to use the summit for including emerging high emitters as China and India in a post-Kyoto accord. (June 2007) Ref. 436

Norway plans to become the world’s first “carbon neutral” country, by reducing its emissions to zero by 2050, or paying for equivalent reductions elsewhere. (June 2007) Ref. 436

The UN Secretary General will hold a special high-level meeting on climate change prior to the September Heads of State and Government summit. He called climate change the “defining issue of our era.” (June 2007) Ref. 436

Possible Tougher Policies Concerning Climate Change

Environment ministers from around the world will meet next month (November 2006) in
Nairobi, Kenya, for talks on post-Kyoto policies. Some want clearer timetables and frameworks on the next phase of greenhouse gases cuts. German Chancellor Angela Merkel wants to make addressing climate change a top priority on the agenda as she assumes the top position in both the G8 and the EU in 2007. She also wants to use Germany's presidency of the EU to push for the reduction of energy use, including bringing around the big greenhouse gases emitters that do not yet have adequate reduction policies. (October 2006) Ref. 1179

G20 climate summit advocates “clean technologies” Rather than targets to tackle climate change

Energy and environment ministers attending the G20 climate summit in London advocated more implementation of “clean technologies” than use of targets to tackle climate change. The 'G20' represents the nations that emit the most greenhouse gases. Global warming induced by human activities appears also to be responsible for rising global ocean levels twice as fast today as they did 150 years ago, according to a Rutgers (the State University of New Jersey) study. The ocean has been rising almost two millimeters per year in the last 200 years compared to a steady one millimeter annually for the previous 5,000 years. See also further in this report item 6.2 Climate Change Futures: Health, Ecological and Economic Dimensions, a comprehensive report on the implications of climate change.

Note: The Eleventh Conference of the Parties (COP 11) to the UN Framework Convention on Climate Change and the first Meeting of the Parties (MOP 1) to the Kyoto Protocol, is currently going on, from 28 November to 9 December 2005 in Montreal, Canada. About 10,000 delegates from 189 nations are participating. The December environmental security report will report on the outcomes. (November 2005) Ref. 1180

Post-Kyoto Strategies

UN Meeting Fails to Agree on Post-Kyoto Strategy

The UN meeting in Bonn trying to extend the spectrum of the Kyoto Protocol after 2012 failed to agree on an international post–Kyoto framework mainly because of EU-US disagreements and major emerging economies that are reluctant to curb their surging greenhouse gas emissions. This two-day seminar attended by delegates from 190 nations, was the first formal UN climate meeting since the Kyoto Protocol entered into force. The next negotiations will be at a meeting of environment ministers in Montreal, Canada, in December. (May 2005)

Ambitious Post-Kyoto EU Emissions Goals

EU environmental ministers seek to push for more ambitious EU emissions targets after the current Kyoto target period [see Kyoto Protocol], proposing a reduction of developed nations' greenhouse gases emissions of 15-30 percent by 2020 and 60-80 percent by 2050 relative to 1990. However, while keeping the 2020 target, the EU heads of state and government omitted the 2050 goal, with the provision to review it later in the light of future developments. The UN Secretary-General’s UN reform report asks for a more inclusive international framework for mitigating climate change, and calls on all states for a better mobilization to develop tools for stabilizing greenhouse gas emissions beyond 2012, with broader participation by all major emitters. (March 2005)

EU Environment Ministers Propose post-Kyoto Protocol Climate Policies

Now that the Russian ratification will bring the Kyoto Protocol into force, the European environment ministers are planning to initiate talks within the UN on climate policies that would follow after 2012 (when the Protocol's first commitment period ends). The next UN Climate Conference (COP10) will be this December in Buenos Aires and the European Council will meet
next spring on its climate policy objectives. The EU’s general climate objective is to pursue polices leading to temperatures that would not exceed pre-industrial levels by more than two degrees Celsius. Meanwhile, the European Environmental Ministers are planning to ban the more destructive fluorinated gases in certain products, which European Environment Commissioner Margot Wallström said “have huge global warming potential - in some cases almost 24,000 times that of carbon dioxide." The Ministers also plan to regulate leakage of these gases prior to their complete phase-out. They propose to ban the use of fluorinated gases in double-glazing, fire extinguishers, car tires and recreational items. There was also a call for concrete action to reduce emissions from international aviation and shipping industries. (October 2004) Ref. 1181

Second European Climate Change Program and post-Kyoto Negotiations
On Monday, 24 October, Environment Commissioner Stavros Dimas launched the second European Climate Change Program (ECCP II) at a stakeholder conference in Brussels. ECCP II will focus on strategies and technologies that would allow the EU to reduce its greenhouse gas emissions (including carbon capture and storage) and to adapt to the effects of climate change. Commissioner Dimas outlined the Commission’s views on the further development of EU climate change policy including after 2012 and called on all states to adhere to the eventual post-Kyoto measures. He underlined EU commitment to initiate a process that will lead to international negotiations on a global climate change regime. Global negotiations for post-2012 strategies will take place at the UN Climate Change Conference (COP 11 and COP/MOP 1) to be held on November 28-December 9, 2005 in Montreal. [See also UN Meeting Fails to Agree on Post-Kyoto Strategy in May 2005 and other previous environmental security reports.] (October 2005) Ref.1182

G8 Environmental Results Are Limited to Post-2012 Concerns
Although the Gleneagles meeting of the G8 industrialized nations did not generate measurable targets and timetables for tackling greenhouse gas emissions, the heads of government of the world's eight wealthiest nations agreed that "climate change is happening now, that human activity is contributing to it, and that it could affect every part of the globe." They also set the stage for dialogues for post-Kyoto regulations that would include the US and other high-emitting countries such as China and India. The dialogues are planned to start with a meeting in London in November to be organized by the British government. (July 2005) Ref.1183

Montreal Conference on Climate Change Reached New Agreements (2005)
Thirty decisions were reached during the first Meeting of the Parties to the Kyoto Protocol (COP/MOP 1) that was held November 29 to December 9, 2005 in conjunction with the eleventh Conference of the Parties to the UN Framework Convention on Climate Change (COP 11), which reached 14 decisions. This package of decisions was named the “Montreal Action Plan” by Stéphane Dion, President of COP 11 and COP/MOP 1. The Plan is a “clear roadmap” for international cooperation to reduce greenhouse gas emissions and to develop approaches to cope with consequences of climate changes. It also has established a forum to find innovative solutions. The complete listing of these decisions is available at Decisions adopted by COP11 and COP/MOP1. Some highlights include:

- The Marrakesh Accords were accepted at COP/MOP 1 as a “clear rulebook” of the Kyoto Protocol that sets the framework for the Protocol’s implementation and enforcement, including a system for an effective global carbon market. A complex compliance regime
was accepted and members of the compliance committee were elected to strengthen Kyoto’s Parties’ accountability in meeting their emission reductions targets. A review for improving the Kyoto Protocol will be formally launched at next year’s UNFCCC meeting.

- There are two mechanisms for developed countries to earn greenhouse gas emission credits: 1) The Clean Development Mechanism gives developed countries emission credits for investing in sustainable development projects in developing countries. (Developed nations have pledged over $13 million for this mechanism to be expanded in 2006-07.); and 2) The Joint Implementation mechanism gives developed countries emission credits for investments in low greenhouse gas emissions projects in other developed countries (in particular in transition economies).

- Negotiations for new emissions reduction targets for developed countries in the post-Kyoto period (2013-2017) were approved to begin May 2006. This is to ensure that negotiations are concluded in time to avoid any gap between the first phase and the second phase beginning in 2013.

- A Five Year Plan of Action on Adaptation addresses concrete steps to identify climate change impacts and measures to adapt to it —mainly for developing countries. A one-year process to define how the Adaptation Fund will be managed and operated was approved.

- COP requested the Global Environmental Facility to consider adding carbon capture and storage technologies to those areas receiving financial support. International cooperation in developing, adopting, and transferring green technologies was a theme heard throughout the meetings.

- Agreement was achieved to launch a dialogue and series of workshops in 2006 on strategic approaches for long-term global cooperative action to address climate change that might result in a more inclusive UN climate pact (including the U.S. and China). The U.S. agreed to join talks in the future, as long as mandatory emissions targets were not on the agenda.

Approximately 2,800 government officials and 5,800 representatives of UN organizations, intergovernmental organizations and non-governmental organizations attended this comprehensive overview of the world’s state in addressing climate change, witnessed by 817 accredited members of the media. More than 120 ministers and other high-level government officials delivered statements, along with senior representatives of intergovernmental and non-governmental organizations, UN bodies and specialized agencies, and other relevant groups. The reports of 140 NGO “side” sessions can be found at http://www.iisd.ca/climate/cop11/enbots/.

(December 2005) Ref.1184

UN Meeting Fails to Agree on Post-Kyoto Strategy
The UN meeting in Bonn trying to extend the spectrum of the Kyoto Protocol after 2012 failed to agree on an international post-Kyoto framework mainly because of EU-US disagreements and major emerging economies that are reluctant to curb their surging greenhouse gas emissions. This two-day seminar attended by delegates from 190 nations, was the first formal UN climate meeting since the Kyoto Protocol entered into force. The next negotiations will be at a meeting
of environment ministers in Montreal, Canada, in December. [See also items 8.4 Ambitious Post-Kyoto EU Emissions Goals in March 2005 and 7.1 Kyoto Protocol Came into Force on February 16, 2005 in February 2005 environmental security reports.]

A recent World Bank study shows that trade in carbon dioxide permits surged this year since the Kyoto Protocol came into force and as the EU launched its "cap and trade" scheme. (May 2005) Ref.1185

Aviation and Shipping should be Subject to Emissions Cuts

The EU is proposing to include the shipping industry in the Emission Trading Scheme from 2013. However, climate scientists argue that, given the rapid growth of emissions from international aviation and shipping, it is not enough that they are included in the carbon-trading scheme, but they should be subject to emissions cuts regulations. [See also Aviation to be included in the ETS from 2012 in July-August 2008, Shipping to Face New Regulations to Reduce Air Pollution in September 2007.]

Meantime, local actions are increasing. In California, a “clean trucks” program put in place by local port authorities will begin operating 1 October, when all pre-1989 diesel rigs will be barred from entering the Los Angeles and Long Beach waterfront marine terminals. The restrictions will continue incrementally through 1 January 2012, when only trucks meeting federal 2007 emission standards will be allowed in. (September 2008) Ref.1186

Aviation to be included in the EU Emissions Trading System from 2012

The European Parliament adopted legislation to include aviation in the EU Emissions Trading System starting January 1, 2012. The regulation applies to all flights starting and/or landing in Europe (including intercontinental flights) by EU and non-EU airlines. Exceptions apply to: flights for humanitarian purposes under a UN mandate; emergency flights; police, customs and military flights; research flights; and small airline companies producing low emissions. [See also Provisional Agreement for Including Aviation in the Emission Trading Scheme from 2012 in June 2008 and other related items in previous environmental security reports.] (July-August 2008) Ref. 1187

Air Travel in the EU to Join the Carbon Emissions Trading System by 2011

The European Parliament voted to have EU internal and intercontinental flights join the bloc’s carbon emissions trading system by 2011 and that the pollution cap be set at 90% of average emissions from the period 2004-2006. The bill will now be debated by member states. (November 2007) Ref.1188

EC Strategy to Curb Greenhouse Gas Emissions from Air Travel

EU Advances the Inclusion of Airlines into the Emissions Trading System to 2010

The EU criticized the recent 36th Assembly of the International Civil Aviation Organization for failing to adopt a framework to reduce greenhouse gas emissions from international aviation. In turn, EU lawmakers proposed to move ahead—to 2010—the inclusion of all airlines flying to, from, and within the EU into the Emission Trading Scheme. The original proposal suggested 2011 for the inter-EU flights and 2012 for international flights landing in or departing from the 27 EU countries. The European Parliament is expected to vote on the bill in November. [See also Europe to Propose Emissions Targets for All Flights to/from or within Europe in November]
Europe to Begin Penalizing Jet Pollution in 2011
The European Commission is moving forward with its proposal for a directive to bring civil aviation into the EU Emissions Trading Scheme (EU ETS) by imposing extra charges on highly polluting carriers. The legally binding rules will apply to all flights within the EU starting in 2011, and from 2012 to foreign carriers landing and taking off from European airports. [See also Europe to Propose Emissions Targets for All Flights To/From or Within Europe in November 2006 and EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel in September 2005 environmental security reports.] (October 2007) Ref. 1189

Europe to Propose Emissions Targets for All Flights To/From or Within Europe
The European Commission is proposing to introduce a new policy that would impose emissions controls on all flights within and coming into Europe, seeking to strengthen pollution reduction regulations around the world. The proposal, expected to be presented around December 20, requires airlines to meet emissions targets starting January 1, 2011, for all flights within Europe and round-trips to the European Union from any other part of the world. The proposal also outlines a system and timeframe for airlines to buy carbon credits. [See also EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel in September 2005 environmental security report.] (November 2006) Ref. 1190

Europe Considers Aviation Policies to Reduce Greenhouse Gases
The European Parliament is increasing its discussions on the impact of aviation on climate change, considering introducing kerosene taxes, and having the industry join the Kyoto Protocol-induced obligations. The World Travel & Tourism Council opposes such measures, which—they say—do not take into consideration the larger picture of the challenges which need to be managed, including jobs, economic impact, and even a negative effect on pollution. (July 2006) Ref. 1192

EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel
Considering the rapid increase of air travel and consequently its increased share in the overall EU greenhouse gas emissions undermining progress achieved through emission cuts in other areas of the economy, the EC proposed a strategy to tackle aviation emissions. It suggests bringing aircraft operators into the EU’s Greenhouse Gas Emissions Trading Scheme (ETS), as an incentive for airlines to minimize their emissions. The new regulation would apply to all flights departing from the EU, whether to another EU destination or not and all carriers (EU or non-EU) would be treated equally. (September 2005) Ref. 1193

National and Regional Initiatives

Ambitious Post-Kyoto EU Emissions Goals
EU environmental ministers seek to push for more ambitious EU emissions targets after the current Kyoto target period [see Kyoto Protocol], proposing a reduction of developed nations' greenhouse gases emissions of 15-30 percent by 2020 and 60-80 percent by 2050 relative to
1990. However, while keeping the 2020 target, the EU heads of state and government omitted the 2050 goal, with the provision to review it later in the light of future developments. The UN Secretary-General’s UN reform report asks for a more inclusive international framework for mitigating climate change, and calls on all states for a better mobilization to develop tools for stabilizing greenhouse gas emissions beyond 2012, with broader participation by all major emitters. (March 2005) Ref.1194

Japan is considering strengthening national regulations (such as introducing compulsory caps on greenhouse gas emissions and a domestic emissions trading scheme for the companies that resist reducing emissions). It is also expected to make tougher commitments in the post-Kyoto Protocol phase. (February 2008) Ref.1195

The meeting of the environment ministers from the Group of Eight industrialized nations held in Kobe, Japan, concluded with an agreement on the long-term goal of cutting greenhouse gas emissions in half by 2050, but without any specific emissions reduction targets for 2020. (May 2008) Ref.1196

China’s CO₂ emissions grew much more than previous estimates, revealed a new analysis by economists at the University of California. The Intergovernmental Panel on Climate Change estimated annual CO₂ increase in the region that includes China at 2.5%–5% for 2004–2010, while the new University of California analysis estimates a growth rate of at least 11% for the same time period. This finding reinforces beliefs that any climate change treaty should include mandatory emission targets for big emitter developing countries. (March 2008) Ref.1197

The newly elected Australian government sponsored a 2020 summit during April 2008. One thousand selected invitees spent two days considering ten themes, including Australia’s long-term role in the region. A detailed response to the summit is expected from the Government by the end of 2008. The new Australian government has taken a more aggressive approach to CO₂ emissions reduction and the 2020 summit held in April 2008 encouraged the government to further take a regional lead in this area. The government has committed Australia to a carbon-trading scheme by 2010.

Governors of 20 U.S. states signed the Governors’ Declaration on Climate Change at the 2008 Conference on Climate Change held at Yale University. The Declaration is establishing a partnership between the states and the federal government to increase efforts to control and reduce greenhouse gas emissions. At the same meeting, Premier Jean Charest of Quebec, Canada, announced that Quebec is joining the Western Climate Initiative, which calls for a 15% reduction in greenhouse gas emissions below 2005 levels by 2020.

While negotiations for a post-2012 treaty continue, questions are growing about better enforcement mechanisms of the Kyoto Protocol to compel governments to respect their commitments. Change of government shouldn’t allow policy changes relative to a country’s international commitments and ratified regulations. Canada, Japan and some southern European countries are all well behind their targets. “The biggest concern comes from countries like Canada that have openly begun voicing doubts about whether they will comply or even care about complying,” said Antonio Hill, from Oxfam. (April 2008) Ref.1198
Meeting of Asia-Pacific Partnership on Clean Development and Climate
The Asia-Pacific Partnership on Clean Development and Climate, comprising Australia, U.S., Japan, India, South Korea, and China, a group accounting for about 50% of global greenhouse gas emissions, held its meeting on January 11-12 in Sydney. The Partnership is intended to be consistent with the countries' commitment under the UN Framework Convention on Climate Change and “complement, but not replace, the Kyoto Protocol.” The six nations did not set any binding targets or regulations to cut greenhouse gases, but adopted a Charter that outlines the purposes, organization, functions, funding, and terms of the Partnership. The meeting also prepared the Partnership Work Plan that sets the framework of the partnership, based on collaboration among private, research and government organizations to accelerate the development and implementation of advanced clean and efficient technologies that would increase energy security and reduce greenhouse gases without hindering economic development. The eight public-private sector Task Forces established would be covering “(1) cleaner fossil energy; (2) renewable energy and distributed generation; (3) power generation and transmission; (4) steel; (5) aluminum; (6) cement; (7) coal mining; and (8) buildings and appliances.” The task forces will submit plans by mid-2006. It was also proposed to establish an Asia-Pacific Energy Technology Co-operation Centre, for the “development and implementation of an energy audit program and its follow-up projects.” (January 2006) Ref. 1199

U.S., Australia, and Asia-Pacific Countries Coalition for Clean Development
The Asia-Pacific Partnership on Clean Development and Climate founded by the U.S., Australia, China, India, Japan, and the Republic of Korea, aims to address energy security, air pollution, and climate change issues based on cooperation in the development, implementation, and exchange of new, clean technologies. The joint Vision Statement was issued at the Association of Southeast Asian Nations' annual ministerial meetings in Vientiane, Laos. The six countries combined represent more than half of the world's economy, population, and energy use, and are responsible for half of the world's greenhouse gas emissions. This initiative is "a complement, not an alternative," to the 1992 United Nations Framework Convention on Climate Change and the 1997 Kyoto Protocol, said U.S. Deputy Secretary of State Robert Zoellick. (July 2005) Ref.1200

New Zealand Adopts Carbon Trading Scheme in 2009
The New Zealand Parliament passed the Climate Change (Emissions Trading and Renewable Preference) Bill that will set up the country’s first emissions trading scheme to help meet the country’s obligations under the Kyoto Protocol. The carbon credits system begins in 2009 and is set by sectors. All industries in a sector will effectively set limits on the amount of emitted greenhouse gas, with those who surpass their ceilings having to buy credits from emitters that produced emissions below their ceiling. The phases of sector inclusion are: forestry from 2008; transport by 2009; stationary energy, such as coal-fired power stations by 2010; and agricultural waste by 2013. Australia’s carbon trading scheme is set to begin by 2010. (September 2008) Ref.1201

China Adopting Pollution Tax Systems
Reportedly China formed a team of experts from several government agencies to study whether to impose an environmental tax on polluters to encourage emissions cuts. Deputy Minister for Environmental Protection Pan Yue was quoted as saying that the team is also assessing issues of
compensation for environmental damage and creation of a trading system for polluting gases. There are no details of the proposed tax or when it might be introduced. China already introduced taxes aimed at emission reductions: in 2007 it cut export tax rebates for energy-intensive products, and in September 2008 it raised consumption taxes on large passenger vehicles. (September 2008) Ref. 1202

**New Jersey Ports Pushing for Toxic Diesels Ban**
The New Jersey Port Authority is considering imposing a ban of some kind on polluting diesel trucks at the ports of Newark and Elizabeth, perhaps similar to the one already set up in Southern California. [See also *Aviation and Shipping should be Subject to Emissions Cuts* in September 2008 environmental security report.] (January 2009) Ref. 1203

**Energy Saving**

**Ban on Incandescent Light Bulbs Expands**
As part of the plan to cut down on energy consumption and greenhouse gas emissions, the phase-out of incandescent bulbs expands. Canada is expected to introduce new regulations by the end of this year, requesting the phase-out of inefficient incandescent lighting in common uses be completed by 2012. Canada is the second country to introduce such a nationwide regulation, after Australia, where the ban is scheduled for 2009–10. [See also *Compact Fluorescent Light Bulbs (CFLs) May Surge to Fore*, *European Lamp Companies Push Compact Fluorescents, as Does the EU*.] (April 2007) Ref.1204

**Compact Fluorescent Light Bulbs (CFLs) May Surge to Fore**
A bill to be introduced in the California legislature to ban the use of incandescent light bulbs by 2012, in favor of compact fluorescents, may presage a worldwide tendency in this direction. With global warming concerns burgeoning and CFLs using 75% less energy, this action by California (if it becomes law) could trigger similar measures around the world over the next few years. (February 2007) Ref.1205

**European Lamp Companies Push Compact Fluorescents, as Does the EU**
The European Lamp Companies Federation, whose members include the world's three largest light bulb manufacturers, has said they will push European consumers to switch to energy-saving compact fluorescent bulbs (CFLs). According to an AP dispatch, “The European Union is already encouraging its 27 member governments to promote the use of efficient lights on streets and in offices. The ELC Federation statement said its members 'urge the European Commission to adopt a similarly proactive approach to domestic lighting'.” (March 2007) Ref.1206

**EU to Set Higher Targets for Cuts in Energy Consumption**
The European Parliament's Industry Committee approved a proposal for raising energy consumption cuts from the earlier target of 10% to 11.5% over the period 2006-2015. The new schedule is to cut 3% from 2006 to 2009, 4% from 2009 to 2012, and an additional 4.5% from 2012 to 2015. During the Brussels European Council Summit at the end of March, the EU heads of state and government reiterated the importance of implementing the Lisbon Strategy for
growth, competitiveness and social cohesion in today's knowledge-based world, and addressed climate change and sustainable development. They also emphasized EU preparations for the September UN Summit and its substantial role in achieving the Millennium Development Goals. (April 2004) Ref.1207

**European Commission’s New Low-carbon 20/20/20 by 2020 Energy Plan**
The European Commission has proposed a package of measures to reach its “20/20/20 by 2020” targets — produce 20% of its energy from renewable sources and increase energy efficiency by 20%, cut greenhouse gas emissions by 20% of 1990 levels (or 30% in case of a global accord), and considerably reduce reliance on energy imports. The detailed roadmap includes specific renewable energy and CO₂ emission targets for each EU member state; new rules for carbon sequestration; and an updated Emissions Trading System for fair greenhouse gas emissions cuts for different emitters, with the aim of gradually including all industries in the emissions auction scheme. The Commission's proposals have to be endorsed by the European Council and Parliament, with the final package expected to come into force by the end of 2009. The European Commission hopes that the plan will trigger strong momentum towards a global agreement. Meanwhile, the European Commission is also considering introducing a climate tax on imports from states failing to tackle greenhouse gas emissions, and toughening EU’s emission trading system. [See also *EU Energy and Climate Change Policy* in March 2007 environmental security report.] (January 2008) Ref.1208

**New Technologies**

**International Convention for the Evaluation of New Technologies needed**
ETC Group is collaborating with other partners to develop an International Convention for the Evaluation of New Technologies (ICENT), which it hopes to submit to the United Nations in 2004. ETC group expressed concern about the potential impacts that nanotechnology-based products might have on the environment and health, because these products are coming to market in the absence of government regulations and/or public discussion (October 2003) Ref.1210

**ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations**
An ETC Group report, *Extreme Genetic Engineering; An Introduction to Synthetic Biology*, covers five major areas of research in synthetic biology: making minimal microbes; assembly line DNA; building artificial cells from the bottom up; and pathway engineering and expanding earth’s genetic system. The report looks at implications for trade, a synthetic energy agenda, intellectual property, the politics of biodiversity, and it warns, “today’s synbio industry has made the work of bioweaponeers a whole lot easier.” It looks at ‘synthetic governance’ and gives some recommendations including the need for establishing an international body to monitor and assess societal impacts of emerging technologies—including synthetic biology—to facilitate coordinated global action, and the fact that “building blocks of life” shouldn’t be privatized. The ETC Group presented the report and its recommendations at the World Social Forum held in Nairobi, Kenya, January 20-25. Note: In September 2006, the European Commission 6th Framework Programme, NEST–New
and Emerging Science and Technology published the report *Synbiology: An Analysis of Synthetic Biology Research in Europe and North America*, which is a synthesis of “1100 papers connected to the Synthetic Biology field in peer-reviewed journals published since 1990.” (January 2007) Ref. 1211

**Increasing Militarization of Space Might Require Outer Space Treaty Review**

The European Space Agency Ministerial meeting in The Hague, Netherlands held November 25–26 adopted a new European space policy, which increases ESA’s role in addressing climate change and global security, setting new objectives and budgets for the agency. The programs include: Earth Observation activities (including the second segment of the Global Monitoring for Environment and Security Space Component); the Meteosat 3rd generation and a novel Climate Change Initiative; continued improvement of the Galileo navigation satellite system; and start of a Space Situational Awareness programme to help protect European space systems against space debris and the influence of adverse space weather. [See also *Increased Use of Space Technology for Monitoring Environmental Events* in September 2008 and other related items in previous environmental security reports.]

The Space, Security and the Economy report by Economists for Peace and Security warns that the present U.S. space dominance policy threatens an arms race in space with possible devastating consequences for the economy and the growing scientific and commercial uses of space. The report calls for greater transparency in military space spending, and detailed information about government and commercial space activities. Along the same lines, the report *From Venus to Mars: the European Union’s steps towards the militarisation of space* by the Netherlands-based think-tank Transnational Institute argues that European and international trends to increasingly use space for military rather than civilian objectives might trigger a new arms race; and, therefore, the UN Outer Space Treaty might need to be reconsidered and broadened. (November 2008) Ref. 1212

**China’s ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution**

The January 11, 2007 Chinese anti-satellite (ASAT) test created tens of thousands of new pieces of space debris in low-earth orbit (LEO) with size greater than 1 cm—large enough to cause significant damage to a satellite they might hit. So far about 900 pieces greater than 5-10 cm have been cataloged as being created by the Chinese test. Even without the Chinese test, a NASA model shows that some heavily used parts of LEO already have such a high density of debris that collisions of objects at these altitudes will increase the number of debris fragments by 200% in two hundred years. The January additions make this situation worse, and multiple future tests or uses of such ASATs—especially against much larger satellites—could greatly increase the threat to satellites, the Space Station, space shuttles and other space craft as they travel through this polluted space. At high altitudes, where the atmosphere is very thin, this debris can stay in orbit for centuries, and so far there is no effective way to remove it. This is likely to steadily increase space insurance costs and without major changes could eventually seriously limit access to space. This shows that one actor can affect future access to space for all. Currently 41 nations own satellites. Since there is no mechanism to address this pollution event, some kind of anti-ASAT debris creating treaty seems inevitable, possibly drafted by the Inter-Agency Space Debris Coordination Committee in Vienna. (February 2007) Ref. 1213

*Nanotechnology* –see [Nanotechnology](#) section at “Potential Health Threats of Some New
Nuclear Safety

IAEA Director Warns on Continuous Nuclear Safety Issues
In his annual report to the UN General Assembly, International Atomic Energy Agency Chief Mohamed ElBaradei said that nearly 250 incidents involving theft or loss of nuclear or radioactive material were reported to the Agency during the year ending in June 2008, meaning that the threat of radioactive material use by terrorist or malicious forces remains high. Also troubling is that much of that material is not subsequently recovered, or sometimes material is found that was never reported missing. He reiterated the need for effective binding international agreements and global nuclear security standards, advanced and independent verification technology, and stronger legal authority and resources for the Agency. Since 1993 when IAEA data exchange began, 1,340 incidents were reported, including 18 with highly enriched uranium or plutonium. (October 2008) Ref.1215

IAEA Director’s Recommendations to Improve Nuclear Safety
At the IAEA’s 51st annual General Conference held in Vienna, Director General Mohamed ElBaradei called on all countries to ratify the Amendment on the Physical Protection of Nuclear Material of the International Convention on the Suppression of Acts of Nuclear Terrorism, to strengthen the protection of nuclear materials and increase nuclear security. In the meantime, experts attending the scientific forum convened by the IAEA’s ‘Global Challenges and the Development of Atomic Energy: The Next 25 Years’ noted that in view of the world’s energy needs’ likely to increase by 50% over the next 25 years, nuclear technology is expected to expand, increasing the risks associated with the spread of sensitive nuclear know-how, including enrichment and reprocessing technologies. [See also Increasing Nuclear Safety and Security in March 2006 and other related items in previous environmental security reports.] (September 2007) Ref.1216

International Norms Led by IAEA Are Needed to Stop Smuggling of Nuclear Materials and Nuclear Proliferation
During a Security for a New Century briefing at the U.S. Capitol, November 27, 2007, David Albright, President of the Institute for Science and International Security said that A.Q. Khan’s nuclear smuggling network may be just the tip of an iceberg, and national systems of enforcement are dangerously inadequate. He recommended that the International Atomic Energy Agency lead the creation of new international norms for everything from export controls for nuclear-related materials to a determination of what is classified information about nuclear energy. He also said that corporations should not do business with any trading company unless they can show that the end user could not contribute to nuclear proliferation. Financial loss due to discovery that their materials ended up in illegal nuclear programs will be higher than the financial loss from not selling the products. In a related development, Edit Herczog, Member of the European Parliament, declared at NATO’s November 23, 2007 Advanced Research Workshop held in Budapest on “Energy and Environmental Challenges to Security” that the EURATOM treaty may need a new focus on such security issues as non-proliferation and radiation protection. The EURATOM treaty has
never been amended since its establishment 50 years ago. [See also Nuclear Safety in September 2007, Increasing Nuclear Safety and Security in March 2006 and other related items in previous environmental security reports.] (November 2007) Ref.1217

Advancements in Setting the Agenda for the 2010 NPT Review
The first meeting of the International Commission on Nuclear Nonproliferation and Disarmament was held in Sydney, October 20-21, 2008. As stated in the press conference, the Commission is at an “idea-formulating stage, … refining and defining the issues” and formulating the work plan. The framework of negotiations is based on the NPT three pillars: disarmament, non-proliferation, and peaceful use. The Commission was created to help set the agenda for the 2010 Nuclear Nonproliferation Treaty review conference. [See also Australia to Propose Panel to Advance Work for the NPT Review in 2010 in June 2008 and other similar items in previous environmental security reports.] (October 2008) Ref.1218

Importance of Nuclear Weapon Disarmament Reiterated by UN
Progress toward Nuclear Weapon Disarmament continued with the 27th edition of the UN Disarmament Yearbook released on September 5, 2003. The UN Secretary General stated that the total elimination of nuclear weapons must remain a top priority. (September 2003) Ref.1219

Waste Management

New types of wastes disposal/management need to be addressed.

Toxic Waste Disposal of Global Growing Concern
The scandal around the dumping of toxic waste at Abidjan, Ivory Coast has intensified the global debate concerning trade in waste and the adequacy of the Basel Convention. Some African and Asian countries became dumping grounds for hazardous waste, such as radioactive uranium waste, lead, cadmium, mercury, industrial and hospital chemicals, and the rising volume of electronic waste. Although the Basel Convention and its 1995 amendment ban dumping of toxic waste in countries without proper facilities for handling it, the process continues illegally in countries that are not party to the Convention. In addition to environmental and health consequences, a Senegalese ecologist points out the security aspect associated with illegal dumping since "the waste is often accepted by corrupt people or factions who want money to buy weapons". As a consequence of the Ivory Coast scandal, the Prime Minister dissolved his cabinet and elections are jeopardized in a country already tormented by conflicts. [See also New Measures for Regulating E-waste in August 2006, as well as Basel Convention on Hazardous Wastes to be Made More Effective in July 2005 and other related items in previous environmental security scanning reports.] (September 2006) Ref. 1221

UN University study calls for reducing electronic waste and hazards
Computers and the Environment: Understanding and Managing their impacts, a recent UNU study, presents the environmental impact of personal computers’ manufacturing and argues the efficiency of the present legislation on limitation of the use of some hazardous chemicals and electronic waste management. The report calls for a better understanding of the impacts and the necessity to take appropriate action worldwide to halt "the growth of high-tech trash (March
Global Environmentally Sound E-waste Disposal System is Needed

Environmentally Sound Management (ESM) of Electronic and Electrical Wastes (e-waste) is a new program of action for the Asia-Pacific region aiming to achieve environmentally sound disposal of e-waste and to stop illegal trafficking of hazardous e-materials. The program is supported by UNEP Basel Convention Regional Centres in China, Indonesia, and the South Pacific (SPREP-Samoa) and focuses on capacity building at regional and national levels for best implementation of the Convention, assessment of the current situation and design of best strategies to cope with e-waste in the conditions of the region’s rapid development. At the program’s launch festivity, the need for developing an international e-waste recycling systems along with transparent information and monitoring mechanisms to ensure accountability was highlighted.

A new study, *The Digital Dump: Exporting Reuse and Abuse to Africa*, by the Basel Action Network, based in Seattle, reports that most of the computer equipment sent from the United States to developing countries as “aid” are not usable, creating environmental problems in already challenged places. Local sources say that the port of Lagos, Nigeria, receives 400,000 used computers a month, 75% of which are junk that must be disposed of, raising environmental issues. [See related items *Two E-waste laws entered into force in the European Union of February 2003, and E-waste Management Directive Came into Effect on August 13, 2005* of August 2005 environmental security reports.] (November 2005) Ref. 1223

European Parliament Proposes Tougher Waste Management Strategy

The European Parliament has voted for a tougher waste management strategy, which stipulates that EU production of waste should be stabilized at 2008 levels by 2012, and scaled back by 2020, requiring that 50% of municipal waste and 70% of industrial waste be recycled by 2020. Although the new directive would not impose firm obligations on member states it would establish a "general rule or guiding principle" influencing future waste management practices. EU member states have different waste management strategies and efficiency and are expected to fight the Parliament's proposal. [See also *EU New Strategy on Waste Recycling in December 2005, New EU Environmental Strategies in September 2005, and Recycling Regulations in the EU* in August 2005 environmental security reports.] (February 2007) Ref. 1224

EU Preparing New Directives on Waste Management and Water Quality


EU Vote on Revision of Waste Directive

The European Parliament approved the revision of the waste framework directive, which is the basis of the EU waste management policy. The new directive will replace three others—Waste Framework Directive, the Hazardous Waste Directive and the Waste Oils Directive, setting clear definitions and waste management principles and creating a sound, harmonized legal framework for waste treatment. [See also *EU New Strategy on Waste Recycling* in December 2005 and other
similar items in previous environmental security reports.] (June 2008) Ref.1226

**Basel Convention Needs Revision and Update**
The 9th meeting of the Conference of the Parties to the Basel Convention (COP9) on the Control of Transboundary Movements of Hazardous Wastes and their Disposal took place June 23-27, in Bali, Indonesia. The focus was a stronger regulation on the export of hazardous waste, mainly electronics which litter poor nations. Despite support from the African delegates and the EU, the representatives from 170 countries to the conference decided against banning toxic waste exports, rather encouraging voluntary actions at national level using some new guidelines to create their own recycling laws. [See also *Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?* in April 2008, *UN E-Waste Forum and Basel Convention’s Conference of Parties* in December 2006, and other related items in previous environmental security reports.] (June 2008) Ref.1227

**Basel Convention on Hazardous Wastes to be Made More Effective**
The Basel Convention on the Transboundary Movement of Hazardous Wastes and Their Disposal might be strengthened by new proposals prepared for the biannual ministerial conference to be held in late 2006. Issues on the Open Ended Working Group’s agenda include used mobile phones, obsolete ships dismantling, furthering the ratification and implementation of the Protocol on Liability and Compensation, mobilizing funds and empowering the Convention’s Regional Centers, and drafting technical guidelines for promoting the environmentally sound management of various kinds of hazardous wastes. [See also *Basel Convention on the Transboundary Movements of Hazardous Wastes* of October 2004 and previous environmental security scanning reports on the Basel Convention.] (July 2005) Ref. 1228

**Basel Convention on the Transboundary Movements of Hazardous Wastes**
The COP7 of the Basel Convention on the Transboundary movements of hazardous wastes focused on increasing electronic waste issues, and disposal of old military vessels and decommissioned fishing boats. Under the theme ‘Partnership for meeting the global waste challenge,’ the participants agreed that partnership between governments; partnership with the private sector, international organizations and NGOs; and synergies with other chemical management conventions, such as the Rotterdam and Stockholm Conventions, are key for environmentally sound waste management policies. (October 2004) Ref. 1229

**UN E-Waste Forum and Basel Convention’s Conference of Parties**
Electronic devices account for 20-50 million metric tons of waste per year around the world that introduce lead, cadmium, mercury and other hazardous wastes into the land and water supplies. To counter the acceleration of this problem, over 500 experts from more than 150 countries met at the UN offices in Nairobi, Kenya, November 27–December 1 for the Conference of the Parties (COP8) to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The conference theme was “Creating innovative solutions through the Basel Convention for the environmentally sound management of electronic waste.” An e-waste declaration and more than 30 decisions were adopted, including synergies and cooperation among the Basel, Rotterdam and Stockholm Conventions (UNEP/CHW.8/CRP.8), safer ship dismantling procedures, amendments to the guidelines for the environmentally sound
management (ESM) of persistent organic pollutant wastes, the 2007-2008 program, and implementation of the Strategic Plan for the Implementation of the Basel Convention to 2010. The E-waste Declaration called for wider transfer of information on technologies and e-waste management from developed to developing countries, prevention and fighting e-waste trafficking, introduction of broader and stronger national legislation to control e-waste management, promotion of eco-friendly technologies and phasing-out toxic components, and raising awareness of e-waste issues and integrated systems to reduce and limit damage due to e-waste. The meeting also discussed environmentally sound management of ship dismantling and agreed to a draft ship recycling convention, as well as the need for greater guidance in managing abandoned ships. The next COP will take place in fall 2008, in Indonesia. [See also Toxic Waste Disposal of Global Growing Concern in September 2006, Basel Convention on Hazardous Wastes to be Made More Effective in July 2005, and other related items in previous environmental security reports.]

[Note: By 2010, an estimated 100 million phones and 300 million personal computers might become waste. In the U.S., it is estimated that 14–20 million personal computers are thrown out each year; developing nations are expected to triple their output of all electronic waste by 2010.] (December 2006) Ref. 1230

EU Vote on Revision of Waste Directive
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EU Pollution Prevention Strategy to focus on recycling of waste
The EU environment ministers held an informal meeting 14-16 May 2004 in Waterford, Ireland. The main topic on the ministers' agenda was the EU’s proposed Thematic Strategy for the prevention and recycling of waste. Originally introduced for consultation in May 2003 and focusing on a life-cycle approach, the proposed strategy calls for waste reduction targets of 20% by 2010 for hazardous waste, municipal waste, and industrial waste. To boost recycling, the proposal also set a legally binding target of 40% reduction in disposal by landfill and incineration by 2010, and a zero-disposal target for 2050. The European Parliament is already on record as endorsing future legislation giving preference to waste disposal over re-use and recycling only when there is clear evidence that it is more environmentally friendly, and has also rejected compulsory waste reduction plans, favoring voluntary agreements instead. As an outcome of the May 2004 meeting, the life-cycle approach was confirmed as the mechanism to follow, but specific targets for waste reduction were not endorsed. (May 2004) Ref.1232

Higher Targets for Packaging Recycling and Recovery
The EU updated and strengthened its 1994 Directive for packaging waste, setting higher recycling and recovery targets to further reduce the negative environmental impacts created by the landflling and incineration of packaging waste and by the production of virgin materials. This type of waste includes packaging made from paper, glass, metals, plastics and wood. (August 2005) Ref. 1233
**Firm regulations for perchlorates, a component in rocket fuel, are needed**

Large scale dumping of perchlorates, a component in rocket fuel continues to pollute underground water in the United States due to lack of regulations. Although aircraft and missile developers were warned of this problem for many years, rather than addressing the problem, the Department of Defense (DOD) has ignored it, says Gene Ayres, author of the article *Rocket Fuel in our Food*, appeared in World Watch Magazine. While EPA openly acknowledges the gravity of the situation, there are not yet firm regulations for perchlorates.

EXTi (Electro Oxidation Technologies), a San Jose company, recently announced a new technology able to clean perchlorate (and nitrate) polluted water. National and international regulations seem inevitable in order to stop and/or limit the pollution. (October 2003) Ref.1234

**Medications disposal**

The disposal of antibiotics, expired medications, and endocrine disrupting compounds such as birth control pills via the wastewater system is a relatively new issue, but one which has long-range ramifications for the development of new wastewater treatment and sewage disposal regulations in the future. Current wastewater treatment requirements and technology do not address all of these pollutants, which pass through the wastewater system and reenter the environment downstream. Some of these compounds may then bioaccumulate and affect human health upon consumption. Current food safety laws do not address testing for all such compounds. Other compounds may interfere with the hormonal cycles of flora and fauna, disrupting reproductive cycles, or cause antibiotic-resistant strains of bacteria to emerge. (October 2003) Ref.1235

**Weapons-related**

**European Parliament Passed Resolution Calling for Global Ban of DU Weapons**

The European Parliament agreed, with 491 out of 521 votes, to accept a resolution calling on the EU to lead negotiations “through the UN or through a 'coalition of the willing’” for a global treaty to ban depleted uranium weapons. The resolution “Strongly reiterates its call on all Member States and NATO countries to impose a moratorium on the use of depleted uranium weapons and to redouble efforts towards a global ban, as well as systematically to halt production and procurement of this type of weaponry.” It also recommends inclusion of this wording in the European Security Strategy, “the need to give serious thought to the future utility of unguided munitions, as well as cluster bombs, mines and other weapons of indiscriminate effect, such as depleted uranium weapons;” and “not to deploy military and civilian personnel in regions where no guarantee can be given to the effect that depleted uranium has not been, or will not be, used.” [See also *Depleted Uranium Environmental Concerns Resurfacing* in November 2007 and other items on this issue in previous environmental security reports.] (May 2008) Ref.1237

**Support for Total Ban on Nuclear Weapons Increases**

Marking the 40th anniversary of the nuclear Non-Proliferation Treaty, on July 1, 2008, members of the European Parliament launched a Parliamentary declaration in support of the Nuclear Weapons Convention and a move towards total elimination of nuclear arsenals. Meantime, Australia established the International Commission on Nuclear Non-Proliferation and
Disarmament, the Seven Nation Initiative for nuclear disarmament got revived, and both U.S. presidential candidates supported the vision of a nuclear weapons-free world. [See also *Australia to Propose Panel to Advance Work for the NPT Review in 2010* in June 2008, *Non-Proliferation Treaty Deadlock Continues* in May 2008 and other related items in previous environmental security reports.] (July-August 2008) Ref.1238

**Australia to Propose Panel to Advance Work for the NPT Review in 2010**
Australian Prime Minister Kevin Rudd announced plans to create an International Commission on Nuclear Nonproliferation and Disarmament to make constructive recommendation for the 2010 Nuclear Nonproliferation Treaty Review Conference. The commission would follow on the work of Australian-led 1996 Canberra Commission and Japan’s Tokyo Forum. The first report of the panel is supposed to be presented at a major international conference of experts in Australia late 2009. [See also *Non-Proliferation Treaty Deadlock Continues* in May 2008 and other similar items in previous environmental security reports.] Meantime, the intergovernmental Financial Action Task Force warns that the international community is failing to efficiently control financial transactions that help fund illegal production, technology transfer, and trade of chemical, biological and nuclear weapons. Free-trade zones and transshipment hubs in the Netherlands, Singapore and the UAE are specifically vulnerable sites. (June 2008) Ref.1239

**Revitalizing Nuclear Disarmament**
‘The Challenge of Abolishing Nuclear Weapons’ conference discussed a variety of measures to eliminate the threat of nuclear weapons. Emphasis was on a Nuclear Weapons Convention, a draft of which (created by civil society organizations) was already submitted to the UN by Costa Rica. Along the same lines, nuclear experts attending the Pugwash 50th Anniversary workshop ‘Revitalizing Nuclear Disarmament’ discussed actions that both nuclear and non-nuclear states should take in order to further the goal of declaring nuclear weapons illegal and eliminating them entirely. (September 2007) Ref.1240

**Non-Proliferation Treaty Deadlock Continues**
The second of three sessions of the Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non–Proliferation of Nuclear Weapons (NPT) was held from April 28 to May 9 at the UN Office at Geneva, Switzerland. Participation included delegates of 106 States parties, representatives of specialized international organizations, and of 64 NGOs. The main issues discussed included: nuclear non-proliferation, disarmament and international security; nuclear-weapon-free zones; nuclear safeguards; the peaceful use of nuclear energy; and the Middle East situation. No special agreements were reached. The third session will be held May 4-15, 2009, and the Review Conference will be April 26–May 21, 2010, both in New York. (May 2008) Ref.1241

**Nuclear Nonproliferation Treaty Stalemate Continues**
No progress was achieved by the two-week annual session for preparing the 2010 NPT Review Conference. After having its work delayed for six days due to Iran’s disagreement with the agenda, the conference ended with disputes over the session’s final statement. Iran and other Nonaligned Movement nations criticized the statement as being too focused on compliance and not enough on the need for nuclear-weapon states to move toward disarmament. [See also *Review Conference of the Non-Proliferation Treaty*, and *Increasing Calls for Improved*}
Meanwhile, eight more nations joined the Global Initiative to Combat Nuclear Terrorism. Led by Russia and the U.S., this global effort was initiated in 2006, to improve security over nuclear materials and to deter nuclear smuggling. The group now includes 31 nations. The next meeting is scheduled to be held in June, in Kazakhstan. (May 2007) Ref. 1242

**IAEA to Upgrade International Nuclear Event Scale**

The International Atomic Energy Agency (IAEA) will upgrade the International Nuclear Event Scale (INES) system to enhance international safety by promptly informing the public on the scale of a nuclear or radiological incident. The improvements will make the system more versatile and informative, the terminology will be standardized, and issues related to sources and transportation of radioactive material will be better addressed. The INES was originally developed in the 1990s by the UN IAEA and the Nuclear Energy Agency of the OECD to consistently communicate the severity of reported nuclear and radiological events, with a scale ranging from 1 (anomaly) to 7 (major accident). The updated scale is expected to be issued at the end of 2008, after being reviewed by INES members. (September 2007) Ref.1243

**Progress on the Nuclear-Test-Ban Treaty**

The 5th Conference on Facilitating the Entry into Force of the Comprehensive Nuclear-Test-Ban Treaty applauded progress made by the Treaty’s Preparatory Commission in preparing to establish the future CTBT Organization and the Treaty’s verification regime. It also called on the ten states of Annex 2 whose ratification is essential for the treaty’s entry into force to do so. These countries are China, U.S., Democratic People’s Republic of Korea, India, Pakistan, Egypt, Israel, Indonesia, Iran and Colombia. [See also *Call for Comprehensive Nuclear-Test-Ban Treaty Entry into Force* in September 2004 and other related items in previous environmental security reports.] (September 2007) Ref.1244

**Review Conference of the Non-Proliferation Treaty**

In spite of all the current discussions on different forms of nuclear threats, the Review Conference of the Nuclear Non-Proliferation Treaty (NPT) ended its month-long meeting without adopting any significant decisions to improve the NPT and its mechanisms. The three working committees were organized on the main topics of the Treaty: disarmament, verification of safeguards on national nuclear programs, and the peaceful use of atomic energy. No consensus was achieved on any of them and the final document has no “recommendations” section. Yet, many delegates attested their nations’ continuous commitment to push for nuclear disarmament, entry into force of the Comprehensive Nuclear Test Ban Treaty, and other measures to promote nuclear safety. Ambassador Sérgio de Queiroz Duarte (Brazil), President of the Conference, acknowledged, however, that the ways in which the issues have been discussed, the interest of the delegations, the documents presented, and the debates were an important step forward and a great opportunity for the delegations to put forth their nations’ views on how to improve the system of the Treaty. Canadian Ambassador Paul Meyer suggested that annual conferences be held to accelerate progress of the negotiations. Among the positive outcomes of the Conference is the agreement on “indicators of noncompliance” and possible consequences for withdrawal from the treaty.

Meantime, addressing the “Mayors for Peace” conference, UN Secretary-General Kofi Annan called on the world’s mayors to revitalize their view for a global ban on nuclear weapons by
2020 and advance the organization’s Programme to Promote Solidarity of Cities toward the Total Abolition of Nuclear Weapons. (May 2005) Ref. 1245

Call for Comprehensive Nuclear-Test-Ban Treaty to Come into Force
At the recent CTBT ministerial meeting, the participants issued a joint statement calling on all non-signatory States, particularly the 12 whose ratification is mandatory for the treaty’s entry into force, to ratify the document. Representatives of Finland and Japan stressed that this is essential in view of the present threats to security emphasized by the use and proliferation of nuclear weapons technologies and knowledge that has not been adequately addressed. [See also following item Comprehensive Test Ban Treaty Organization to be Restructured]
(September 2004) Ref. 1246

Comprehensive Test Ban Treaty Organization to be Restructured
The Comprehensive Test Ban Treaty (CTBT) Organization will undergo considerable restructuring over the next two years as it progresses from the buildup phase to testing and evaluation, and operation and maintenance. The recently released Report of the 22nd Session of the organization's preparatory commission, held at the end of June 2004, offers some details of the plans. The CTBT will enter into force when 44 required states (Annex 2 States) ratify the treaty; thus far, 32 have ratified it. (July 2004) Ref. 1247

Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction
The second report of the U.N. Security Council 1540 Committee concluded that although nations have made progress since the first report of the committee in April 2006, further measures are needed to completely carry out their obligations under the resolution intended to counter the proliferation of weapons of mass destruction. Information on all 192 U.N. nations was collected, out of which 155 provided reports on their 1540 implementation activities. The committee’s recommendations include enhancing its own efforts, as well as improving collaboration with global and regional intergovernmental organizations to assist nations with the implementation process.
“It’s Asia that has the most potent latent capabilities to develop nuclear, chemical and biological weapons,” said Paul Dibb, professor at the Australian National University’s Strategic and Defense Studies Center, at an Asian Pacific security forum. He also noted that groups such as the Association of Southeast Asian Nations and the Asia-Pacific Economic Cooperation forum have failed to establish effective nonproliferation arrangements, while Australia’s Prime Minister Kevin Rudd’s suggestion for an Asia Pacific Community to deal with security challenges in the region enjoys little enthusiasm. The mission of the new U.N. Regional Center for Peace and Disarmament in Asia and the Pacific, opened in Katmandu, Nepal, is to counter possible nuclear smuggling by terrorist and criminal groups in the region. Meanwhile, the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, initially supporting the program to secure and destroy WMD materials in Russia and Ukraine, agreed to expand their efforts to other countries (not yet specified). [See also New Concerns Rising over Chemical Weapons in April 2007 and other related items in previous environmental security reports.] (July-August 2008) Ref. 1248

Chemical Weapons Convention Gets New Boost
The Second Review Conference for the Chemical Weapons Convention was held in The Hague,
April 7-18, 2008, attended by delegates from 114 of the 183 treaty states. The main issues brought up by participants were: threats posed by the use of chemical weapons by nonstate actors; deadlines for chemical weapons destruction (specifically named were Russia and the U.S., which have to destroy their chemical warfare agents by April 29, 2012, and Japan for destruction of its chemical weapons stockpiles in China); and universal adherence to the treaty. Delegates produced a report that reviews the treaty procedures and implementation issues, and urges the 12 countries that are not yet Party (Angola, the Bahamas, Dominican Republic, Egypt, Guinea-Bissau, Iraq, Israel, Lebanon, Myanmar, North Korea, Somalia and Syria) to join the international disarmament and nonproliferation treaty “as a matter of urgency and without preconditions.” The report does not address the convention’s relation to some new science and technology developments that could produce new threats—such as development of new incapacitating agents, advances in biology and nanotechnology, and industry verification mechanisms. It was proposed that, from now on, the Scientific Advisory Board of the Organization for the Prohibition of Chemical Weapons meet twice a year, not just once as it has previously. [See also New Concerns Rising over Chemical Weapons in April 2007 and other related items in previous environmental security reports.]

In the meantime, Pacific Consultants International warns that Japan is not on schedule for meeting its obligations towards China in the recovery and destruction of hundreds of thousands of chemical weapons abandoned at the end of World War II and will most probably not meet the April 2012 deadline, due to management problems. [See also Japanese Chemical Weapons Cleaning in China Yet to be Completed in June 2007, and other previous environmental security reports on this issue.] (April 2008) Ref.1249

New Concerns Rising over Chemical Weapons
The Organization for the Prohibition of Chemical Weapons (OPCW), the Chemical Weapons Convention’s (CWC) secretariat, focuses on issues related to existing weapons, but specialists argue that new, modern chemicals and production plants could represent even higher risk. Jonathan Tucker of the German Institute for International and Security Affairs in Berlin remarks that a “new generation of small, flexible batch-processing chemical plants that can quickly be switched to producing any number of chemicals are not being inspected at all... and there are five times as many of them as there are declared dual-use plants.” New molecules, such as the "novichok" nerve agents, or "incapacitants" such as fentanyl are overlooked, undermining the "international norm" and confidence in the CWC. [See also Eleventh Chemical Weapons Convention, Five Countries Organize CWC National Authorities, and other related items.] (April 2007) Ref. 1250

Eleventh Chemical Weapons Convention
The 11th Conference of States Parties to the Chemical Weapons Convention (CWC) was held in The Hague, December 5-8. One of the controversial issues discussed concerned “incapacitating agents,” which Peter Herby, head of the Mines-Arms Unit at the International Committee of the Red Cross, considered toxic chemicals. Some experts also argued that using “nonlethal” materials on the battlefield would violate the CWC. There was also a call to clarify which chemicals—other than riot control agents—are allowed under the treaty’s exception for law enforcement, and that all these chemicals be publicly declared. The Conference approved the requests from Russia, the U.S. and several other nations for additional time to eliminate their stockpiles of toxic agents. There are now 181 nations party to the CWC, representing about 98%
of the world’s population and there are calls that all nations become Party to the Convention before its 10th anniversary, next year. [See also Five Countries Organize CWC National Authorities in May 2006, Micro-reactors Challenge Chemical Weapons Convention Effectiveness in August 2005, and Chemical Weapons Convention Annual Conference in December 2004 environmental security reports.] (December 2006) Ref. 1251

Better International Controls Needed to Prevent Bioterrorism

“The biological weapons threat is multiplying and will do so regardless of the countermeasures we try to take,” warns Steven Block, a Stanford University biophysicist and former president of the Biophysical Society. The likelihood of SIMAD (Single Individual Massively Destructive), motivated by ideology or personal issues, is increasing fast and there is no adequate international treaty (the Biological Weapons Convention is not enough) or oversight agency to prevent malicious use of biotechnology work. There is no monitoring of the expanding gene-synthesis industry and the supervision of controversial experiments is voluntary and irregular at universities and private laboratories around the world. While scientists are still arguing on what approach would be the best to increase protection against bioterrorism, they agree on the need for swift and intensified international control to impede the accidental or deliberate release of genetically modified organisms. Along the same lines, China has updated its 2002 list of controlled export materials that could be used to produce biological weapons to fight terrorism. The new list added 14 types of viruses, toxins, bacteria, and equipment, and strengthened export control. (July 2006) Ref. 1252

Time to Strengthen the 1972 Biological Weapons Convention

Because the knowledge of how to weaponize diseases and alter their genetic properties is increasing, the sooner these capabilities are controlled, the safer the world will be. To this end, international experts met in Switzerland December 5-9 to strengthen the 1972 Biological Weapons Convention. Discussions focused on enhancing international surveillance capabilities for infectious diseases and improving national and international response to suspected use of biological or toxic weapons. In addition to a verification regime, Switzerland proposed more attention to biological weapon disarmament to prevent proliferation and terrorist access. Agreements necessary to manage these threats have not been achieved. An international code of conduct for scientists will be considered in 2005 at the Meeting of Experts (13-24 June) and the Meeting of States Parties (5-9 December). The Sixth Review Conference in 2006 will assess the Convention’s operation and implementation.

Bioweapons Report 2004, produced by the Bioweapons Prevention Project, assesses the global state of technology that could be used to create biological weapons and the state of regulations addressing such efforts. It concludes that the BWC “lacks effective mechanisms for monitoring and verifying whether or not states parties are complying with their treaty obligations,” and unless updated at its 2006 review conference, the BWC will become irrelevant. The report also forecasts scientific advances by 2011, indicating that a more responsive mechanism is needed for reviewing scientific developments other than the five-year review conferences. Australia and Indonesia have scheduled a February regional workshop in Melbourne on the BWC and strategies to reduce the possibility of bioterrorism in South Asia. Other countries of the region will also be invited. (December 2004) Ref. 1253
Progress for Enforcing Biological Weapons Convention
This year’s meeting of states parties to the Biological Weapons Convention focused on
strengthening the treaty’s implementation at the national level and advancing regional
cooperation. The Implementation Support Unit established last year presented its report on
helping member states implement the convention. Also discussed were efforts to increase the
pact’s membership beyond the present 159 nations. The Nonaligned Nations Movement
presented several recommendations to strengthen the BWC, such as a verification regime to
ensure compliance, and seven issues to be considered at BWC meetings through 2010, including
stricter export and import controls mechanisms, and monitoring of viruses that could be spread
intentionally or accidentally. The next Meeting of States Parties is scheduled for December 1-
2008 to consider measures to improve biosafety and biosecurity, scientific codes of conduct, and
approaches for increasing awareness. The next review conference of the BWC is scheduled for
2011. [See also Sixth Review Conference of the Biological Weapons Convention in December
2006 and other related environmental security reports.] (December 2007) Ref.1254

Biological Weapons Convention Lacks Enforcement Mechanism, Warns Russian General
Col. Gen. Vladimir Filippov, commander of Russia’s WMD protection force, warned that the
Biological Weapons Convention lacks enforcement mechanisms that would help prevent nations
and terrorists from producing biological warfare agents. The issue was also previously raised by
the Nonaligned Nations Movement at the 2007 meeting of states parties. The next Meeting of
States Parties is scheduled for December 2008 and the review conference of the BWC is planned
for 2011. [See also Progress for Enforcing Biological Weapons Convention in December 2007
and Sixth Review Conference of the Biological Weapons Convention in December 2006 and
other related environmental security reports.] (March 2008) Ref.1255

Biological Weapons Convention Meeting, August 2008
The Meeting of Experts from States parties to the Biological Weapons Convention (BWC) held
in Geneva, August 18–22, 2008, is part of a four-year program to improve effectiveness of the
Convention. The focus of the meeting was increasing biosafety and biosecurity at international,
regional, and national levels. The proposals included: improving awareness and education of
scientists and policymakers; adopting and/or developing codes of conduct (especially for
scientists who deal with biological materials); establishing international standards and external
certification and audit mechanisms; increasing regional and international cooperation to improve
biosafety and biosecurity methods; and organizing workshops for officials and scientists. [See
also Progress for Enforcing Biological Weapons Convention in December 2007 and Sixth
Review Conference of the Biological Weapons Convention in December 2006 and other related
items.] (July-August 2008) Ref.1256

International Convention on Cluster Munitions
International Convention on Cluster Munitions Adopted by 111 Countries
The Convention on Cluster Munitions was formally adopted by 111 countries in Dublin, Ireland,
on May 30, 2008. The Convention is a legally binding instrument that outlaws the use, production,
transfer, and stockpiling of cluster munitions, and commits countries to clear areas contaminated
by cluster munitions and assist victims and affected communities. The President of the
International Committee of the Red Cross, Jakob Kellenberger, urged all countries to adhere to the Convention and noted “these weapons are not only morally unacceptable but also now illegal under international humanitarian law.” The Cluster Munitions Convention will be opened for signature in Oslo, December 2-3, 2008, and will enter into force after 30 ratifications. The U.S., China, and Russia did not participate in the meeting. [See also Negotiations Continue for an International Instrument to Ban Cluster Munitions in November 2007 and other related items in previous environmental security reports.] (May 2008) Ref.1258

Negotiations Continue for an International Instrument to Ban Cluster Munitions
Cluster munitions were the focus of the Convention on Certain Conventional Weapons (CCW) meeting held in Geneva this month that resulted in a weak mandate with no legally binding document or language referring to cluster bomb prohibition or timeline. The EU’s proposal to negotiate a treaty in 2008 banning cluster munitions was rejected. UN Secretary-General Ban Ki-moon underlined in his message to the delegates the necessity of a legally binding international instrument that would prohibit the use, development, stockpiling and transfer of cluster munitions; while promoting the destruction of current stockpiles, battlefield clearance and risk mitigation activities. This is consistent with the aim of the Oslo Process to negotiate a ban on cluster munitions. On November 5, the Global Day of Action to Ban Cluster Bombs, public actions took place in 40 countries, calling on governments to take actions for banning cluster munitions. Supporters hope that momentum was created to advance the negotiations next month, when more than 100 countries will gather in Vienna to discuss a draft treaty. [See also Progress Made on Banning Cluster Bombs in March 2007 and other items on this theme in previous environmental security reports.] (November 2007) Ref.1259

Progress Made on Banning Cluster Bombs
At the Conference on Cluster Munitions held in February 2007 in Oslo, 46 states and several international organizations decided to develop, by 2008, a legally binding international instrument to ban the use, production, transfer, and stockpiling of cluster munitions, as well as to create a framework for dealing with the consequence of cluster munitions’ use in the affected areas. Environmental damage and civil casualties are the highest concern for banning cluster bombs. Next meetings are planned for May/June in Lima, November/December in Vienna and early 2008 in Dublin. Last year Belgium has become the first country to ban cluster bombs, and this month [March 2007] the Belgian Senate passed legislation that criminalizes investment in companies that make cluster munitions. The Belgian Parliament plans to publish a list of companies that manufacture such munitions. Austria announced a moratorium on the use, production, or trade of cluster munitions. Canada promised to destroy its stockpile of cluster munitions. The U.S. Democrats recently introduced a bill in the U.S. Senate proposing to “restrict federal funds for the use, sale or transfer of cluster bombs.” Presently there are 34 countries producing cluster munitions and about 75 countries that stockpile them. [See also related items CCW Protocol V on Explosive Remnants of War Entered into Force in November 2006, NGOs Launch Campaign to Ban Cluster Bombs, and Draft Protocol on Cluster Bombs Cleanup Liability] (March 2007) Ref. 1260

African Countries Call for International Ban on Cluster Bombs
The first meeting of African countries on cluster bombs adopted the “Livingstone Declaration,” endorsed by 38 out of 39 countries (South Africa, one of the continent’s two producer states was
The strong political declaration is formally committing the African countries to the negotiations for a global cluster munitions ban treaty to be held in Dublin, Ireland, May 19-30, 2008. There was widespread support for a broad definition of cluster munitions to avoid exceptions based on so-called ‘technical fixes,’ and on the need for comprehensive liability provisions for the affected communities. The Dublin meeting should conclude the Oslo process and agree on the final terms and language of a cluster bombs ban treaty, which would then be opened for signature before the end of 2008. [See also Negotiations Continue for an International Instrument to Ban Cluster Munitions in November 2007 and other items on this issue in previous environmental security reports.] (April 2008) Ref 1261

NGOs launch campaign to ban cluster bombs
The Cluster Munition Coalition, involving NGOs from around the world, launched a campaign aiming to ban, under international law, the use of cluster bombs. The campaign also calls for help for victims and an overall cleanup of explosive remnants. Several governments - including the Netherlands, Canada, New Zealand and Mexico support the campaign. The campaign has two aims: embedding in international law the responsibilities of parties with regard to ERW, and binding the use of cluster munitions (CM) by universal humanitarian standards. Regarding CM, the campaign aims to restrict use and production, as well as trade in cluster munitions. (November 2003) Ref.1262

IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS

For many environmental regulations, enforcement seems to be not strong enough or there is little understanding worldwide of how they should apply. With the aid of new technologies (such as space surveillance) and meetings discussing the international regulations, it is expected that the situation will improve considerably in the near future.

Developing countries’ compliance with environmental regulations is expected to improve via new modes of international assistance. International organizations, NGOs, and developed countries' governments join efforts to help developing countries understand the importance of a healthy environment, improve their practices to be more environment-friendly, and to understand and comply with the international environmental legislation in place.

UN “Programme performance of the United Nations for the biennium 2002-2003” notes that over the last two years, “a total of 140 governments were supported in the implementation of multilateral environmental agreements through policy advice provided by regional offices in cooperation with United Nations organizations and convention secretariats, and interlinkages among environmental conventions were enhanced, particularly with regard to harmonized reporting.”

Advances in ICT, satellites, sensors, and the Internet are making it possible to monitor environmental agreements more effectively.

Likelihood of Climate Lawsuits Increasing
Advances in environmental science and computer modeling are improving estimates of human-
influenced climate change and its influence on extreme weather events. Some experts suggest that the likelihood of related litigation might increase, as sectors and companies that are considered serious contributors to climate change or promoters of public misinformation could be held liable for climate-change effects. Beyond Adaptation, a paper by WWF UK, notes that a new UN framework to compensate victims of climate change in developing countries is needed and suggests an international compensation fund to be set up by some future UN treaty. (December 2008) Ref. 1264

**New UN-linked Body Proposed to Protect Biodiversity and Ecosystem Services**

As the IPCC helped to put global climate change on the world agenda, a new organization is proposed to do the same for biodiversity and ecosystem services. Building on the Millennium Ecosystem Assessment and the Consultative Process Towards an International Mechanism of Scientific Expertise on Biodiversity, the proposed Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) would bring together the policymaking and scientific communities from the biodiversity and ecosystem areas to provide timely information to support decision making. The framework for the new UN-linked body was discussed at an ad hoc intergovernmental and multi-stakeholder meeting held November 10-12, 2008 in Putrajaya, Malaysia, attended by over 175 participants from nearly 100 countries and more than 20 organizations. The meeting’s results will be presented at the 25th session of the UNEP Governing Council. (November 2008) Ref.1265

**Environmental Testing**

**Assessment of Toxicity Testing for Environmental Agents**

In view of new directives and initiatives for toxicity testing in the U.S. and Europe, and the new testing technologies and methods that are emerging, EPA called for a comprehensive review of the present testing methods and strategies and recommendations for improvement. To that effect, the National Research Council (NRC) designated a Committee on Toxicity Testing and Assessment of Environmental Agents to conduct an independent two-part study. The focus is human toxicology and not ecologic effects of environmental agents. The first part of the study, *Toxicity Testing for Assessment of Environmental Agents: Interim Report* is a comprehensive analysis of the current approaches to toxicity testing and data needs to meet regulations. The committee agrees that new strategies and protocols are needed to improve the efficiency of toxicity screening and address some of the data gaps identified. The second part, expected to be completed by fall 2006, focuses on developing long-range vision and strategy to advance the practices of toxicity testing and human health risk assessment of environmental contaminants. (April 2006) Ref.1266

**Software Toolkit for Control of Hazardous Chemicals**

The Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous and Other Wastes developed a software “toolkit” that would greatly help assessing and managing the hazardous chemicals called polychlorinated biphenyls (PCBs). The PCB Inventory and Management Decision Supportive Tool (DST) will help collect and organize PCB data, and support planning for PCB disposal and transboundary movement. In addition to falling under the scope of the Basel Convention, PCBs are to be phased out of use by 2025 under the Stockholm Convention on Persistent Organic Pollutants. (May 2005) Ref.1267
Calendar with Environmental Deadlines Compliance
The 2008 Compliance Calendar by the Environmental Resource Center is an excellent tool summarizing the most important deadlines for compliance with U.S. environmental regulations and reporting. In addition to highlighting the deadlines, it also contains a summary of the most important environmental regulations and responsible organizations. (September 2007) Ref.1268

UNU Inter-linkages initiative
Environmental Governance in 14 Asian and Pacific Countries - The UNU Inter-linkages Initiative helps understanding and implementation of multilateral environmental agreements at national and regional levels. Ref.: 1269

UNU to discuss global integration of environmental assessments
The Globally-Integrated Environmental Assessment Modeling Forum is an ongoing set of discussions, workshops, peer reviews, and newsletters on issues concerning globally integrated model-supported environmental assessments. Ref.: 1270

Improving Environmental Governance, UNU Reports
Emerging Forces in Environmental Governance
A recent book published by the United Nations University presents arguments for overhauling international environmental governance. It argues that a new environmental coordinating body is needed to solve problems associated with the proliferation of multiple organizations that administer various treaties, conduct research, and maintain the information required to ensure consistent enforcement of existing international environmental agreements. Enforcement options presented include creation of a World Environment Court, a UN Environmental Security Council with binding enforcement powers, and expansion of the UN Security Council mandate to include environmental security. (June 2004)

Reforming International Environmental Governance: From Institutional Limits to Innovative Reforms
Reforming International Environmental Governance: From Institutional Limits to Innovative Reforms by the UNU addresses the international institutional framework that would best serve global environmental governance. The ad hoc nature of the current over 500 international agreements and institutions dealing with environmental issues around the world complicates the implementation and compliance process of environmental regulations. The contributors suggest institutional reform of the current international environmental governance system and evaluate three potential models: enforcement, centralization, and cooperation through increased coordination and collaboration. They examine the possibilities of improving international environmental governance by strengthening UNEP and clustering the existent international regulations; a potential World Environment Organization; and the prospect of a World Environment Court; as well as UN reforms. (May 2005) Ref. 1271

International Conference on Environmental Compliance and Enforcement
Participants from over 60 countries and 125 organizations explored strategies to improve compliance with domestic and international environmental law at the 7th International Conference of the International Network on Environmental Compliance and Enforcement
(INECE) held in Marrakech, Morocco, from 10-15 April 2005. Papers from the conference stressed the relationship of compliance and enforcement to the rule of law to help achieve a system of good governance and ultimately meet sustainable development objectives. Supporting materials are available on the interactive INECE website.

INECE is the only global network of independent experts dedicated to pursuing the rule of law, good environmental governance, and sustainable development at all levels of governance. It links the environmental compliance and enforcement efforts of more than 4,000 practitioners - inspectors, prosecutors, regulators, parliamentarians, judges, and NGOs - from over 120 countries, through training and capacity building programs, raising awareness, and enhancing enforcement cooperation. (April 2005) Ref. 1272

Improving Effectiveness of Multilateral Environmental Agreements
The High-Level Meeting on Compliance with and Enforcement of Multilateral Environmental Agreements (MEAs), organized by UNEP, took place in Colombo, Sri Lanka, 21-22 January. The meeting reviewed and assessed the problems impeding the full implementation of MEAs and the best procedures to help governments comply with their obligations under the various international treaties for protecting the global environment. In addition to looking into the technical aspects of compliance, the meeting also explored new legal, structural, and institutional improvements, such as synergies, inter-linkages, and clustering of MEAs. The draft Chair’s Summary identifies 23 challenges grouped in 3 categories (institutional structures; interlinkages; and instruments to improve implementation) that need further consideration, capacity building, and resources. The Summary will serve UNEP in developing an action plan to improve MEAs’ compliance and enforcement. The plan is expected to be presented to the UNEP Governing Council in 2007.

Note: The UNU Inter-Linkages Initiative helps the governments of 14 Asian and Pacific Countries understand and implement multilateral environmental agreements at national and regional levels http://www.unu.edu/inter-linkages [See Developing countries’ compliance with environmental regulations is expected to improve via new modes of international assistance in January 2003 environmental security report] (January 2006) Ref. 1273

Environmental Performance Index to Help Improve Policymaking
The Pilot 2006 Environmental Performance Index measures countries’ performance relative to environmental targets, and aims to provide an analytical and empirical tool for improving policy choices. The Index is composed of 16 indicators from six policy categories: environmental health; air quality; water resources; biodiversity and habitat; productive natural resources; and sustainable energy. The indicators included in the index are: child mortality, indoor air pollution, drinking water, adequate sanitation, urban particulates, regional ozone, nitrogen loading, water consumption, wilderness protection, ecoregion protection, timber harvest rate, agricultural subsidies, overfishing, energy efficiency, renewable energy, and CO2 per unit of GDP. Based on the Index, the five top ranked countries are: New Zealand, Sweden, Finland, Czech Republic, and the UK. The U.S. is ranked 28th. However, the report also shows the ranking based on the components of the Index, thus providing countries useful information to review their policies and improve environmental decisionmaking. The Pilot 2006 Environmental Performance Index was developed by the Center for Environmental Law & Policy at Yale University and the Center for International Earth Science Information Network (CIESIN) at Columbia University in collaboration with the World Economic Forum and the Joint Research Centre of the European
Commission and was formally released at the annual meeting of the World Economic Forum, in Davos, on January 26, 2006. (January 2006) Ref. 1274

**First International Research Center for “Creeping” Environmental Issues**
The world’s first international research center dedicated to ‘creeping environmental problems' has been established in the northwestern Chinese city of Lanzhou. These are the slow and cumulative problems, like global warming and desertification. The Center's vice-president, Ye Qian, is from the US National Center for Atmospheric Research. There will be more than 20 scientists from various countries working on the center’s projects. (June 2005) Ref. 1275

**East African Projects to Fight Environmental Crime and Link Journalists**
The Environmental Crime Project launched jointly by the Institute for Security Studies and Eastern Africa Police Chiefs Cooperation Organization has the mandate to develop mechanisms to improve environmental law enforcement and policy making in the East African region. The project will operate in Uganda, Kenya, Tanzania, Burundi, Rwanda, Seychelles, Ethiopia and Sudan, increasing protection against all forms of environmental crimes.

The new Network of Climate Journalists in the Greater Horn of Africa (NECJOGHA, www.necjogha.org) represents an interactive resource for environment-related information and communication in the region. The network is the result of collaboration among many international and national environment organizations, universities, and climate centers. (July-August 2008) Ref. 1276

**Conviction in Transborder Electromagnetic Pollution Case**
Cardinal Roberto Tucci, former head of Vatican Radio's management committee, and the Rev. Pasquale Borgomeo, the station's director general, were convicted by a Rome court for polluting the environment with electromagnetic waves from a transmission tower in the Rome suburb of Cesano, damaging the health of those living nearby. Although under the 1929 Treaty between the Holy See and Italy, Vatican is an independent city-state, Italy's Supreme Court ruled that the case could be tried. (May 2005) Ref. 1277

**Developing countries’ compliance with environmental regulations is expected to improve via new modes of international assistance**
The Global Judges Symposium concerning capacity building of legal stakeholders - Senior Judges and UNEP are helping developing countries improve their international environmental law capacity. UNEP convened a Global Judges Symposium on Sustainable Development and the Role of Law in Johannesburg from 18 to 20 August 2002. Chief Justices and other senior judges from approximately 70 countries around the world participated in the Symposium. These experts are convinced that the worldwide effort to crack down on environmentally-damaging developments and comply with agreements covering issues ranging from hazardous wastes to the trade in endangered species is being undermined. This is partly due to weaknesses in many countries' legal systems, but mainly as a result of lax enforcement. Ref.1278

**IAEA to Improve Nuclear Security in 35 Countries**
The EU contributed €7 million to IAEA’s Nuclear Security Fund to improve nuclear security in 35 countries, including 27 in Africa. The focus will be to secure radioactive materials and sites at risk of sabotage and improve capabilities to detect and respond to illicit trafficking in some
African countries, including Ghana, South Africa, Morocco, Nigeria, Sudan, Tanzania, Uganda and Zambia. The program will also work to strengthen national legislation and regulatory infrastructures related to nuclear and radioactive material in—among other countries—Azerbaijan, Cape Verde, Comoros, Croatia, Swaziland, and the Former Yugoslavia Republic of Macedonia. Despite the latest contribution, “IAEA’s nuclear security programme remained 90 per cent funded through unpredictable and heavily conditioned voluntary contributions,” notes IAEA Director General Mohamed ElBaradei. (July 2007) Ref.1279

**IAEA Nuclear Terror Prevention Guide**
The International Atomic Energy Agency published a new manual, *Combating Illicit Trafficking in Nuclear and Other Radioactive Material*, to help harmonize the activities of the organizations involved in the process of detecting and/or responding to nuclear terror-related incidents. The 156-page manual is a cooperative effort of Interpol and the World Customs Organization. (January 2008) Ref.1280

**Comprehensive Test Ban Treaty Organization to be Restructured**
The Comprehensive Test Ban Treaty (CTBT) Organization will undergo considerable restructuring over the next two years as it progresses from the buildup phase to testing and evaluation, and operation and maintenance. The recently released Report of the 22nd Session of the organization's preparatory commission, held at the end of June 2004, offers some details of the plans. The CTBT will enter into force when 44 required states (Annex 2 States) ratify the treaty; thus far, 32 have ratified it. (July 2004) Ref. 1281

**The UN Security Council Increased its Role in Preventing Terrorist Access to Weapons of Mass Destruction**
The UN Security Council unanimously adopted on April 28, 2004 a binding resolution criminalizing the production and/or acquisition of weapons of mass destruction by non-state actors. The Council decided that "all States…shall adopt and enforce appropriate effective laws which prohibit any non-State actor to manufacture, acquire, possess, develop, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery, in particular for terrorist purposes, as well as attempts to engage in any of the foregoing activities, participate in them as an accomplice, assist or finance them." Being considered under Chapter VII of the UN Charter, the resolution is enforceable by the Security Council through tribunals, embargoes, or military force after all peaceful means of persuading delinquent Member States have been exhausted. However, during the debate, it was underlined that the Council would have to get separate approval for the means of enforcement. During the next two years a committee designated by the Security Council will monitor the implementation of the resolution and within six months all States are expected to present reports on their efforts to execute the provisions. (April 2004) Ref.1282

**Problems with Destruction of Chemical Weapons and Potential Proliferation**
Only 30% of known chemical weapons stocks have been destroyed over the past ten years. The remaining 70% are supposed to be totally destroyed by 2012 to meet the Chemical Weapons Convention. Also during the UN First Committee (Disarmament and International Security) session, it was reported that while reliable safeguards structures have been established in many countries, moving chemical and biological production to Africa, Asia, Eastern Europe, and Latin
America, where industrial regulations are inadequate, creates new verification challenges. The first Industry and Protection Forum to promote the implementation of the Chemical Weapons Convention and to discuss practical implementation issues will be held at the World Forum Convention Center in The Hague, November 1-2. [See also New Concerns Rising over Chemical Weapons in April 2007 and other related items in previous environmental security reports.]

Concerning nuclear disarmament, Mexico’s representative introduced a draft resolution on behalf of the New Agenda Coalition (Brazil, Egypt, Ireland, Mexico, New Zealand, South Africa and Sweden): “Towards a nuclear-weapon-free world, accelerating the implementation of nuclear disarmament commitment.” (October 2007) Ref.1283

**Progress in the Elimination of Chemical Weapons Stockpiles**

Participants to the 13th session of the Conference of the States Parties to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction held at The Hague, December 2-5, 2008, noted progress as nearly half of the stockpiles of chemical warfare materials declared by possessor States have been verifiably destroyed, it and reiterated the call that the actions be completed by the required April 29, 2012 deadline. Two countries have finished the operations, work continues in India, Russia and U.S., and Japan has begun the cleanup of chemical weapons abandoned in China during World War II, while Libya has yet to begin the process. The U.S. has already acknowledged that it can’t meet the deadline and there are also considerable doubts about Russia and Japan meeting it. One of the main issues considered at the meeting was the 2009 budget for the convention’s verification and monitoring body, the Organization for the Prohibition of Chemical Weapons. [See also Problems with Destruction of Chemical Weapons and Potential Proliferation in October 2007, and other related items in previous environmental security reports.] (December 2008) Ref. 1284

**Biological Weapons Convention Enforcement**

**PrepCom to Set Agenda for the BWC Review Conference**

The Preparatory Committee for the Sixth Review Conference of the Biological Weapons Convention met in Geneva to prepare the agenda along with organizational and financial matters for the Review Conference to be held in November 2006. The Review Conference will examine the operations of the Convention since its review in 2002. It will also discuss new technological developments, and further actions necessary to strengthen the BWC (formally called the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction). Masood Khan, Pakistan’s ambassador to the UN and expected president of the review conference, chaired the meeting. [See also Recommendation for a Biosecurity Watchdog in February 2006 and Time to Strengthen the 1972 Biological Weapons Convention in December 2004 environmental security reports.] (April 2006) Ref. 1285

The Meeting of Experts to Strengthen a Global Ban on Biological Weapons

The Meeting of Experts was held in preamble to the annual meetings of the States Parties to the Biological and Toxin Weapons Convention (BTWC). Experts from 150 States Parties and UN World Health Organization (WHO) and Food and Agriculture Organization (FAO), focused on addressing the legal framework necessary for implementation and enforcement of the
Convention’s requirements, and security mechanisms concerning pathogenic microorganisms and toxins. (August-September 2003) Ref.1286

Recommendation for a Biosecurity Watchdog
Globalization, Biosecurity, and the Future of the Life Sciences, a report by the U.S. National Research Council and Institute of Medicine of the National Academies assesses the evolution of science and technology capabilities over the next 5-10 years with implications for next-generation bio-threats. Acknowledging that the accelerating pace of life sciences discoveries worldwide has fundamentally changed the spectrum of threats, it looks into next-generation bio-weapons and recommends ways to prevent misuse of science, including strengthening the scientific expertise of security organizations, and the creation of an independent science-and-technology advisory committee for intelligence agencies, as well as the promotion within the international scientific community of a common culture of awareness and responsibility to prevent misuse of science. In that context, one of the co-authors of the report, Canadian Peter A. Singer, suggests the creation of a global advisory group that would act as a watchdog to prevent science being misused to produce biological weapons. He advocates that Canada should advance the idea of such a network at the upcoming G8 Meeting to be held this summer in Russia and which would have infectious disease as one of its three priorities.

Note: the preliminary negotiations for setting up a verification body to strengthen the Biological Weapons Convention, failed. The talks took place this month in Tokyo in preparation for the next review conference to be held in November, in Geneva. [See also Codes of Conduct for Scientists to Strengthen the Biological Weapons Convention in December 2005, and Time to Strengthen the 1972 Biological Weapons Convention in December 2004 environmental security reports.] (February 2006) Ref.1287

Codes of Conduct for Scientists to Strengthen the Biological Weapons Convention
States Parties to the Biological Weapons Convention met this month in Geneva to conclude a three-year process designed to enhance the implementation of the Convention by adopting a set of principles to guide the development of codes of conduct concerning sensitive biological research. In view of present and future threats posed by biological and toxin weapons, States Parties agreed on a range of different approaches for addressing the codes of conduct function of national specifics and using existing mechanisms and frameworks whenever possible without impeding scientific discovery, or placing unnecessary constraints on research or peaceful international cooperation. Also, it was agreed that the codes and their underlying principles should be widely known and understood, and developed in cooperation with those concerned. States Parties to the BWC will meet again in Geneva, April 26–28 2006 for the Preparatory Committee and then November 20–December 8, 2006 for the Review Conference. [See also Time to Strengthen the 1972 Biological Weapons Convention in December 2004 environmental security report.] (December 2005) Ref. 1288

Sixth Review Conference of the Biological Weapons Convention
The three-week review Conference of the Biological Weapons Convention made some positive steps forward that included giving more power to the present temporary secretariat to oversee the treaty and monitor compliance, and holding, by 2011, four intersessional meetings on the treaty topics—enhancing national implementation, measures to improve biosecurity, scientific codes of conduct, peaceful scientific cooperation, and assistance to any country that does fall victim to
biological weapons. One representative criticized the conference for not addressing future issues such as new nonlethal agents and nanotech-related methods for delivering biological agents. [See also PrepCom to Set Agenda for the BWC Review Conference in April 2006, Recommendation for a Biosecurity Watchdog in February 2006, and Time to Strengthen the 1972 Biological Weapons Convention in December 2004 environmental security reports.] (December 2006) Ref. 1289

Overview of Explosive Remnants of War Protocol
The Arms Control Web site published a comprehensive overview of the current state of affairs of the abandoned ammunition and unexploded ordnance and the Explosive Remnants of War (ERW) Protocol. The ERW is Protocol V to the Convention on Certain Conventional Weapons (CCW), aiming to make governments clean up battlefields after armed conflicts end. (September 2004) Ref. 1290

Improved Cooperation Among International Organizations to Fight Marine Pollution
The fight against marine pollution gained strength with the signing of a Memorandum of Understanding between the Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, and the UNEP Regional Seas Programme. The effort is designed to implement environmentally sound management of hazardous wastes in order to prevent coastal and marine pollution. It is based on collaboration of the 13 Basel Convention Regional Centres (BCRCs) with the various Regional Seas Programmes, and reciprocal technical and legal training support. [The Basel Convention regulates the movement of hazardous waste; it covers toxic, poisonous, explosive, corrosive, flammable, ecotoxic, and infectious wastes that are being moved from one country to another.]

IMO Secretary-General Efthimios E. Mitropoulos and the European Commissioner responsible for the environment, Stavros Dimas, also had a meeting this month focusing on better collaboration between the two organizations to enhance marine environmental protection from pollution from ships and related activities. They agreed on the need for ratification, by as many States as possible, of the newest IMO conventions such as the Ballast Water Management Convention and the Convention on Anti-fouling Systems, to enable them to come into force soon.

The amendments to the MARPOL Convention—including the revised phase-out schedule for single-hull tankers and a new regulation on the carriage of heavy grades of oil—will enter into force on April 5, 2005; and, on May 19, 2005, Annex VI of MARPOL on regulations for the prevention of air pollution from ships will be effective. (March 2005) Ref. 1291

Global Map of Human Impacts to Marine Ecosystems
The first-ever comprehensive atlas showing the impact of human activities on the planet’s marine environment is now available online. The international team of scientists combined the impact data of 17 different activities—ranging from fishing and commercial shipping to pollution and climate change—for 20 different marine ecosystems. The database could be used to monitor further future modifications in the global marine environment. The map reveals that while no ecosystem is completely unaffected, human activities had high impact on over 40% of the world’s ocean-covered area. The biggest human impact seems to be in the North Sea, the South and East China Seas, the Caribbean, and North America’s East Coast. Although the Arctic and the Antarctic areas are the least affected today, scientists are concerned that increased
melting of the ice sheets will increase human activities into these areas. (February 2008) Ref.1292

**Water Footprint Measuring System**

On the occasion of World Water Day, reminding of possible conflicts over water, UN Secretary-General Ban Ki-moon urged the international community to create strategies for using water more efficiently and sharing it more fairly. Similarly, researchers suggest that it is timely to use a system to measure water footprint similar to that used for carbon footprint. A symposium held by the UNESCO-IHE (Institute for Water Education) discussed the “virtual water” issue specifically related to the world energy markets. It was pointed out that present practices are not sustainable and therefore it is necessary to introduce a system to measure water footprint in order to help better understand water issues, identify areas with highest impact, and develop adequate policies. Calculating a water footprint might increase awareness and influence practices, similar to the impact that carbon footprint has. [See also *World Leaders Discuss Environmental Security Policies at Davos* in January 2007, *Water Scarcity* in March 2007, *World Water Forum* in March 2006, and other previous environmental security reports on the water issue.] (arch 2008) Ref.1293

**Kyoto/Climate Change**

- Compliance Body Set Up for Kyoto Protocol
- Stricter Measures to Protect Polar Regions Expected
- Lawsuits over Failure to Meet Kyoto Commitments
- Global Warming Goes to Court
- Global Division of Financial Responsibility for Global Warming Impacts
- EU Not on Track Meeting Kyoto Requirements

**Compliance Body Set Up for Kyoto Protocol**

The Compliance Committee for the Kyoto Protocol “designed to ensure the environmental integrity of the agreement and to contribute to the credibility of the carbon market created by the Protocol” has begun its operations, announced the UN Framework Convention on Climate Change. The 20-member Committee has two branches: the Enforcement Branch of the Committee that deals with non-compliance consequences for Parties that do not meet their commitments under the Protocol, and the Facilitative Branch of the Committee, that would provide advice and assistance to countries having difficulties meeting their commitments. The Committee deals with individual cases as they come up, and reports annually to the meeting of the Parties to the Protocol.

A European study, *An economic assessment of the Kyoto Protocol application*, states that the United States’ stand on the Kyoto Protocol influences the economic consequences of the Protocol implementation more than any other factor or region. The analysis considered four main factors: the participation of the United States—the major emissions-producing country; and the role of Russia—the potential major emission credit seller; the Marrakech Accords’ CO₂ sinks; and the trading mechanisms and related trade restrictions defined by the Protocol; and boycott movements. The report aims to help assess the most cost-effective options to reduce greenhouse gases emissions globally. [See also *Montreal Conference on Climate Change Reached New Agreements* in December 2005, *UN Meeting Fails to Agree on Post-Kyoto Strategy* in May 2005 and other previous environmental security reports.] (March 2006) Ref. 1294
Lawsuits over Failure to Meet Kyoto Commitments
The Friends of the Earth threaten to sue the government of Canada over its refusal to adopt adequate policies to cut greenhouse-gas emissions and meet its commitments as agreed under the Kyoto Protocol. The environmental group will file the lawsuit with the Canadian federal court and the Kyoto Protocol Compliance Committee, unless the government changes its position. In May, South Africa filed with the international Kyoto Committee a complaint against Canada and 14 other countries over failure to report on their progress, as required. [See also Global Warming Goes to Court in October 2006 environmental security report.] (November 2006) Ref. 1295

Global Warming Goes to Court
The New Zealand High Court has ruled that climate change factors can be considered during Greenpeace’s upcoming appeal against the proposed Marsden B coal-burning power station. Greenpeace appealed the permission granted to the Marsden B power station to start burning coal, on grounds of environmental and mainly climate change consequences. Although this ruling is limited to New Zealand and to a specific industry, it creates a precedent with effects likely to be felt in other jurisdictions and sectors. In November, the U.S. Supreme Court will hear the case of Massachusetts v. Environmental Protection Agency (case 05-1120) filed by twelve states and several cities on EPA’s role to regulate CO2 as a greenhouse gas pollutant under the Clean Air Act. Over 16 other litigations are pending in U.S. federal and state courts against companies whose emissions are linked to global warming; more are expected to come. Swiss Re, the world’s largest reinsurance company, estimates that the annual liability costs of global warming will be $150 billion dollars per year within ten years. (October 2006) Ref. 1296

Global Division of Financial Responsibility for Global Warming Impacts
Oxfam has called for a system to allocate costs of global warming damage per country based on its percentage of greenhouse contribution. Poorer countries are not included. They list the US with 44%, Japan with 13%, Germany 7%, and so forth. With China’s increasing role, the percentages would be continually adjusted. China will release its first national plan to address climate change just prior to the G8 Meeting, which it will attend in Germany. (May 2007) Ref. 1297

EU Not On Track Meeting Kyoto Requirements
A new study by the UK Institute for Public Policy Research warns that Britain and Sweden are the only countries in Europe that seem to be on target to cut greenhouse gas emissions under the Kyoto Protocol. Of the 15 European countries that ratified the Protocol, 10 would miss their targets unless they take urgent action, while France, Greece, and Germany could fulfill their obligations only if planned polices were successfully implemented. (December 2005) Ref. 1298

OECD Environment Ministers calls for more ambitious policies to meet the environmental targets
At the 20-21 April 2004 meeting, the OECD environment ministers agreed that more ambitious policies supported by stronger political will are needed to meet the environmental targets that they set for 2010 in the OECD Environmental Strategy. A new Environmental Outlook will also be produced. (April 2004) Ref.1299
New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties
The focus of the fourth Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP 4), held from 12-16 May 2008 in Bonn, Germany, was on enforcement measures. It adopted 18 decisions on issues related to: the Biosafety Clearing-House; identification and handling of living modified organisms; notification requirements; risk assessment and risk management; and monitoring and reporting. The timetable and framework were set for a liability and redress regime concerning potential damage caused by the movements of genetically modified organisms, which will be further discussed at the next meeting of the parties to take place in October 2010, in Nagoya, Japan. An ad hoc technical expert group was mandated to consider risk assessment and risk management issues. The *Rules, Procedures and Mechanisms Applicable to Processes under the Cartagena Protocol on Biosafety* was also published at this meeting.

The Ninth Meeting of the Parties to the Convention on Biological Diversity followed, May 19-30, 2008, also in Bonn, Germany, assessing mechanisms to reduce loss of biodiversity. The CBD COP 9 adopted the “Bonn roadmap” that addresses issues concerning an international regime on access and benefit-sharing; a mechanism for assessing marine areas in need of protection; a resolution on biodiversity and climate change, including language cautioning against ocean fertilization; and an agreement on biofuels. [See also *International Biodiversity Meetings Make Decisions and Tougher Systems to Control GMO Suggested* in March 2006 environmental security report.] (May 2008) Ref.1300

European Environmental Liability Directive Came Into Force
The Environmental Liability Directive establishes a comprehensive framework on liability for damage to the environment, based on the “polluter pays” principle. It aims to ensure that the financial liability for environmental damage prevention or remediation falls on the polluters who caused it, rather than on the taxpayers. Operators are financially responsible for ensuring that they have preventive or remedial measures. When the environmental situation involves more than one member state, then they must cooperate on the necessary preventive or remedial actions. The Directive was adopted in April 2004 and member states were supposed to bring into force the appropriate laws and regulations by April 30, 2007. [See also *European Union Polluter Pays Law*] (April 2007) Ref. 1301

Environmental Damage to Be Criminalized in the EU
The Permanent Representatives Committee approved the proposal on the protection of the environment through criminal law. EU national governments will have to apply criminal sanctions to those causing “deliberate or negligent damage to the environment.” The list of punishable crimes will include: unlawful discharge of pollutants which could cause “death or serious injury to any person” or “substantial damage” to the environment; illegal waste shipment; killing or possession of protected fauna or flora; significant deterioration of habitats within protected sites; and any action related to ozone-depleting substances. The penalties are left to the discretion of member states as long as they are “effective, proportionate and dissuasive.” The Directive is pending final approval by the Parliament and the EU Council, and is expected to enter into force in 2010. (May 2008) Ref.1302

Environmental Crime Could Become a Felony in the EU
The EU Commission has proposed that environmental crimes such as pollution with hazardous substances, illegal dumping of waste, or performing environmentally "dangerous activity" be
treated as criminal offenses with minimum levels of punishment that could reach prison sentences or fines for serious cases. By applying the “polluter pays” principle, European courts could also put offenders out of business or order them to clean up the environment. If the proposal is approved by the European Parliament and member governments, it will become law for all 27 member nations. This would be the first criminal law drafted by the Commission after a 2005 EU Court of Justice ruling that that the Commission has the power to draft criminal laws and decide what constitutes a crime, notably in the area of the environment. Environmental groups welcomed the plan but said the list of punishable crimes should be expanded.

([February 2007] Ref. 1303

**EC Enforces Compliance with EU Environmental Regulations**

Nine EU Member States are being referred to the European Court of Justice for failing to transpose into national law the European Environmental Liability Directive by the April 30, 2007 deadline. On June 1, 2007, the Commission sent a first written warning to 23 Member States; 14 have complied and the nine who did not are: Austria, Belgium (concerning the Brussels region only), Greece, Finland, France, Ireland, Luxembourg, Slovenia and the United Kingdom. [See also European Environmental Liability Directive Came Into Force in April 2007 and EC Enforces Compliance of National Legislation with EU Environmental Regulations in October 2007 environmental security reports.] (June 2008) Ref.1304

**EC Legislation Reform First Targets Environment-related Rules**

The European Commission has presented a three-year program to modernize EU legislation as part of its commitment to simplify the EU system of rules. About 250 basic pieces of legislation and 1,250 related legal acts would be updated by repeal, codification, or recasting. The main aims of the legislative reform are to: a) simplify the understanding and implementation of rules; b) transform directives into regulations for prompt and general application by all Member States; and c) improve enforcement. The program will be regularly updated. The process will start with the environment-related sector, since it’s the most heavily regulated. The other sectors, as well as the administrative aspect, will follow shortly. The simplification process can be completed only if the European Parliament and Member States support it. (October 2005) Ref. 1305

**European Commission Enforces Environmental Pollution Legislation**

The Court of Justice of the European Communities ruled that the European Commission (EC) would have the right to require Member States to impose criminal penalties on environmental polluters “in order to ensure that the rules which it [the EC] lays down on environmental protection are fully effective.” Although EU countries will still be the ones to prosecute, the Commission could extend its powers by recommending the level of punishment. This ruling is consistent with the Community’s environmental strategy underlined by the obligation of having environmental protection requirements “integrated into the definition and implementation of the Community’s policies and activities.”

Note: The EC began improving its whole system of regulations, by three main actions: withdrawal or modification of pending proposals; simplification of existing EU-law; and better quality of new Commission proposals. (September 2005) Ref. 1306

**EU Starts Legal Action Against Member States on Breaches of Environmental Law**

The European Commission is enhancing its environmental law enforcement by initiating a series
of legal actions against Member States for breaching EU environmental law. The Commission has decided to pursue legal action against Italy in eleven cases, including non-compliance with the EU directive on Environmental Impact Assessment (EIA), and ten cases for lack of cooperation with the Commission (Article 10 of the Treaty) on issues involving nature protection (a military base enlargement on La Maddalena island); several cases on waste management aspects; water resources; and genetically modified organisms (GMO). Along with Italy, Spain and Greece were also sent final warnings for non-compliance with the EU Water Framework Directive. (October 2005) Ref. 1307

**EU to Increase Environmental Regulations Enforcement**

The European Commission intends to increase the enforcement of environmental regulations by introducing criminal sanctions for serious environmental offences. In light of last month’s Ivory Coast incident of toxic waste dumping, it aims to strengthen enforcement of the EU Waste Shipment Regulation and improve international cooperation to prevent illegal waste shipments. The issue will be addressed at the next Basel Convention conference to be held in Nairobi, November 27-December 1, 2006. [See also Toxic Waste Disposal of Global Growing Concern in September 2006, as well as Basel Convention on Hazardous Wastes to be Made More Effective in July 2005 and other related items in previous environmental security scanning reports.] (October 2006) Ref. 1308

**EC Enforces Compliance of National Legislation with EU Environmental Regulations**

The European Commission opened several infringement procedures against Member States for not complying with EU environmental legislation. Some of the EC legal actions include: referring Ireland to the European Court of Justice over inadequacy of its national legislation for the implementation of the Environmental Impact Assessment Directive; legal action against the UK for not fully complying with ECJ judgments in two separate cases; Luxembourg and Belgium for non-compliance with the EU Directive on urban waste water treatment; final written warning to 12 EU Member States for failing to adopt emergency plans for chemical plants; action against several EU countries for exceeding EU limits on ambient concentrations of SO2; “Letter of Formal Notice” to Estonia, Latvia, and Lithuania for not correctly transposing certain provisions of the WEEE Directive into national legislation, and to Belgium, Denmark, Lithuania, Malta, Finland, and Sweden for inadequate implementation of the RoHS Directive into national law. [See also E-waste Management Directive Came into Effect on August 13, 2005 in August 2005, and RoHS Closer to Deadline in May 2006 environmental security reports.] (October 2007) Ref.1309

**EC Reports EU Environmental Law Enforcement by EU Members is Poor**

European environmental law implementation presents "serious shortcomings" according to the "Fifth Annual Survey on the implementation and enforcement of EU environmental law” covering the year 2003. Timely transposing of environmental laws passed at the European Union level into national laws is the main problem. In 2003, environmental law non-compliance represented over a third of the cases brought before the European Court of Justice. The survey found that most of the infringements were related to air quality, waste disposal and treatment, water quality, nature protection and environmental impact assessments. The report also suggests a more proactive policy in enforcing compliance by designing more “enforcement-friendly” environmental laws, and offering more support to nations in the implementation process. (August
EU Parliamentary Committee Moves to Strengthen Air Pollution Laws
EU Parliamentary Committee to Strengthen Air Pollution Laws by setting binding standards on air polluting substances. (January 2004) Ref. 1311

Aarhus Convention Implementation Strategies
Aarhus Clearing House Launched
Aarhus Convention implementation is made more effective by the launch of a new clearinghouse http://aarhusclearinghouse.unece.org, which provides information on citizens' environmental rights. (September 2004)

Meeting of the Parties (MOP-2) to the Aarhus Convention
The second meeting of the Parties to the Aarhus Convention—UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters—took place in Almaty, Kazakhstan, on 25-27 May 2005. It reviewed progress so far and improvement of its mechanism to increase performance of the Convention’s implementation in all regions. It assessed the application of principle 10 [access to environmental information at all levels] of the Rio Declaration at both global and regional levels. Agreement was reached on an amendment to the Convention for extending the role of the public in decisions involving genetically modified organisms (GMOs). The declaration adopted by the Ministerial segment of the meeting was not yet available at the time of this writing. (May 2005) Ref. 1312

European Network for the Implementation and Enforcement of Environmental Law (IMPEL) increases its role and plans to develop enforcement indicators
Europe's IMPEL (European Network for the Implementation and Enforcement of Environmental Law) is an informal network of the environmental authorities of European Union Members. The network is increasing its policy advisory role and capacity building in EU candidate and accession countries. It also proposes to develop enforcement indicators measuring the success of pollution permits, inspection, and enforcement. Formal work is to be kicked off at the next IMPEL plenary meeting in November. (October 2003) Ref. 1313

UK Suggests Environmental Court similar to Australia and New Zealand
A report for the UK Department for Environment Food and Rural Affairs (DEFRA) has recommended that a specialized court and judges be established to address environmental and “overdevelopment” issues. If the UK environmental court were to be established, becoming the third such national court in the world (after Australia and New Zealand), then increased environmentalist pressure for such a court in the US and other countries will increase. There have even been suggestions for a UN Environmental Security Council. It is reasonable to assume that increasing environmental law with increasing technological capacity to identify infractions will put increased pressure on courts to become more capable of addressing these matters. (August 2004) Ref. 1314

E-waste Directives to be Enforced in the UK
The two EU directives on E-waste will be enforced by UK legislation. The Waste Electrical and Electronic Equipment (WEEE) Directive is expected to be enforced by UK law on August 13,
2005. The WEEE Directive of the EC sets a recycling framework for electrical and electronic equipment in order to minimize the impacts of this kind of waste on the environment. The related directive on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment bans the use in manufacture after July 1, 2006 of certain hazardous substances (lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenylethers (PDBEs)). The two directives on E-waste are already in force at EU level and were supposed to be added to EU Members legal system with rules for monitoring compliance by August 2004. [See Two E-waste laws entered into force in the European Union (EU) in February 2003 environmental security report.] (July 2005) Ref. 1315

**New UK Chemical Data Base for Regulatory Compliance (for REACH)**

The UK's Chemical Industries Association has set up the ReachReady organization and database at www.reachready.co.uk to aid organizations in complying with the EU’s REACH (Registration, Evaluation and Authorization of Chemicals) regulations. [See also Integration of Chemical Regulations (REACH) Approved by European Council in December 2005, The REACH Program Closer to Entry Into Force in March 2005, and other related items in previous environmental security reports.] (April 2006) Ref. 1316

**Denmark to Sue EU Over Annulling Flame Retardant Ban**

The Danish government announced its intent to sue the European Commission over annulling the ban on deca-BDE, a brominated flame-retardant, since it might cause birth defects and cancer. Brominated flame-retardants are a group of chemicals used in electronic devices. The deca-BDE was to be banned starting on July 1, 2006, under the EU Restriction of Hazardous Substances (RoHS) directive, which will regulate the use in new products of certain hazardous substances—lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers (PDBE). However, in October 2005, the European Commission decided to exempt decaBDE from the RoHS Directive. [See also Recycling Regulations in the EU in August 2005 and Two E-waste laws entered into force in the European Union (EU) in February 2003 environmental security reports.] (January 2006) Ref. 1317

**North America’s Commission for Environmental Cooperation to Increase Enforcement of Environmental Regulations and Public Participation**

The Joint Public Advisory Committee (JPAC) of the Commission for Environmental Cooperation (CEC) of Canada, the United States, and Mexico held its third Regular Session for 2006 on 15 September in Montreal, Quebec, to discuss the proposed 2007-2009 Operational Plan. Participants assessed progress on cooperative projects the CEC is implementing to meet the goals and objectives of Looking to the Future: Strategic Plan of the Commission for Environmental Cooperation 2005–2010. The focus was on the implementation of the three program priorities as established by the CEC Council: information for decision-making; capacity building; and trade and environment, mutually reinforcing each other. Proposals called for increased comparability and reliability of environmental data and networks among the U.S., Canada, and Mexico; improved submission and enforcement procedures—to speed the process and increase citizen participation and responsibilities; and creating a North-American comprehensive atlas of all resources, ecosystems, and pollution matters. The Operational Plan will be updated annually, with a rolling three-year horizon, to reflect shifts in programming and associated budget reallocations. (September 2006) Ref. 1318
North America’s CEC Ministerial Statement
At the 12th Regular Session of the Council of the Commission for Environmental Cooperation (CEC), the environment ministers of Canada, Mexico and the United States adopted the Strategic Plan 2005-2010, which sets the priorities and strategies to achieve the goals. This takes into account the recommendations of the Ten-year Review and Assessment Committee, the Joint Public Advisory Committee (JPAC), and key stakeholders. The priorities for the coming years are: the development of Information for Decision Making (based on high quality environmental information that is integrated and comparable); support for Capacity Building; Trade and Environment issues that help promote environmental protection and improve enforcement of environmental law; and Expand Partnerships for Environmental Stewardship. [See also Review of NAFTA's Environmental Side Accord in October 2003 environmental security report. (June 2005) Ref. 1319

States to Sue the Energy Producers Over Global Warming
California and seven other states are to sue five large energy producers who they contend are responsible for nearly 10% of the greenhouse gases emissions of the United States. The suit demands substantial pollution cuts by the companies, saying the carbon dioxide from energy producers is a ‘public nuisance.’ (July 2004) Ref. 1320

North American Environmental Atlas Online
The Commission for Environmental Cooperation (CEC) launched the online North American Environmental Atlas, http://www.cec.org/naatlas, which allows visualizing significant North American environmental issues at a continental scale. It features the terrestrial ecological regions of North America and interactive thematic maps such as priority conservation areas, renewable energy capacity, and population, as well as links to data and related sources. The Atlas is in continuous development with new features and information to be added in the coming months, and suggestions for making the Atlas the most useful possible are welcome. (February 2008) Ref.1321

CEC Invites Public Comment on Draft Document: Future Directions under the Commission for Environmental Cooperation Sound Management of Chemicals Initiative
The draft document Future Directions under the Commission for Environmental Cooperation's Sound Management of Chemicals Initiative is available for public comment, “to assist in determining how the Sound Management of Chemicals (SMOC) initiative can best evolve in future years to assess, reduce and, wherever possible, eliminate threats from toxic chemicals to our environment and health in North America.” (April 2004, ) Ref.1322

A new Biodefense Agency within the Office of the Secretary of the U.S. Department of Defense suggested by the Institute of Medicine and the National Research Council
The issues about how to handle the problems of genetically modified viruses and pathogenic chimeras (artificially created hybrids of disease-causing organisms), in particular those related to smallpox rose on the agenda of the scientific and health communities (including the WHO). The WHO's committee on smallpox research is currently weighing various proposals for new and continuing experimental efforts, including some based at CDC and US Army Medical Research Institute of Infectious Diseases (AMRIID). It is likely that the discussions on bio-
safety/biodefense will soon move from the health and research committees to wider international legislative bodies triggering new Protocols to existing treaties (i.e. Biologic and Toxic Weapons Convention) or even new international treaties dealing with genetic manipulation and its hazards. (January 2004) Ref.1323

ASEAN Seeks East Asia’s Cooperation on Environmental Issues
Senior environmental officials from ASEAN countries, Japan, China, and South Korea met in Malaysia's Penang state to discuss ways to improve regional cooperation and responses to ecological/environmental problems, such as the recent forest fires. Details of future cooperation, which are also expected to cover issues such as climate change and safeguarding biological diversity, will be discussed at a meeting to be held next month in Jakarta. (August 2005) Ref. 1324

Asian Regional Forum on Combating Environmental Crime Formed
The “Asian Regional Forum” will be established to share information and expertise in policy, law, training, investigation and prosecution related to environmental crimes in Asia. The Forum is the result of a meeting in Bangkok on 25 August 2005 of the Regional Intelligence Liaison Office for Asia and the Pacific (RILO A/P), the regional office of INTERPOL, the World Conservation Union, TRAFFIC (the wildlife trade monitoring network), the World Customs Organization, the UK-based Environmental Investigation Agency (EIA) and Thailand's Office of the National Implementation for Chemical Weapons Convention. The regionalization of the Green Customs Initiative was also discussed to share information and training materials for customs officials to combat illegal trade in commodities of environmental concern. It is estimated that environmental damage caused by illegal trade in hazardous wastes, smuggling proscribed hazardous materials, and exploiting and trafficking of protected natural resources worldwide is US$22-31 billion annually. The Forum will be facilitated by the United Nations Environmental Program’s Regional Office for Asia and the Pacific. (September 2005) Ref. 1325

Southwest Pacific Islands Might “Localize” Environment-protection Legislation
In contrast to the preceding item, in the southwestern Pacific ecosystem-based management of coastal areas might become very much decentralized. "The island nations of the south-western Pacific are considering allowing citizens to reclaim legal control of their local seas, in the hope they can use their traditional knowledge, customs and laws to protect fish stocks and biodiversity,” says a New Scientist article. In this plan, villages will own the seas immediately adjacent to them, and can set up environment-protecting restrictions for them, with the legal backing of the central government. (April 2004) Ref. 1326

International environmental law was one of the topics on the agenda of the 2003 International Bar Association Meeting
The International Bar Association held its annual meeting in San Francisco 15-19 September 2003. International environmental law is one of the topics on the agenda. Although the outcomes of the meeting are not yet available, there were several sessions with eventual relevance to environmental security; e.g. Health issues related to exposure to chemicals session held by The Committee for Environment, Health and Safety Law stated that “Comprehensive new legislative requirements affecting virtually all sectors of industry are expected, which raise industrial
concerns that necessary and important chemicals not be banned or delisted without adequate risk assessments." (August-September 2003) Ref.1327

**China’s Emergency Response Law to Punish Falsifying Environmental Information**

The Emergency Response Law, which came into effect in China on November 1st, has the objective of improving public security and reducing the environmental and health effects of natural disasters and industrial accidents. It requires government to provide accurate and timely information on public emergencies, and false reporting is banned and punishable. The law also says that in extremely serious emergency situations, which “severely threaten life and property, state security, public security, environmental security or public order (which are not specifically covered by the provisions in the law), the NPC Standing Committee or the State Council can declare a ‘state of emergency’ in accordance with the Constitution and relevant laws.” [See also *China May Restructure Environmental Effort* in October 2007 and other related items in previous environmental security reports.] (November 2007) Ref.1328

**Indonesian Navy to Tighten Security in Sea Border Areas**

The Indonesian Navy announced that it will tighten security in its eastern and western sea border areas to support law enforcement efforts at sea for reducing illegal activities such as environmental pollution, smuggling, and even manipulation of shipping documents. Their law enforcement efforts will include prosecution and monitoring cases until sanctions are applied. (September 2008) Ref.1329

**United Arab Emirates Establish Nuclear Agency**

The United Arab Emirates’ governing Cabinet approved the establishment of the new Nuclear Energy Authority, with “the mandate to evaluate and develop a peaceful nuclear energy program in line with the recommendations of the International Atomic Energy Agency” as part of its civilian nuclear power program. (March 2008) Ref.1330

**Taiwan Cracking Down on Environmental Violators**

The prevalence of illegal toxic waste dumping has led Taiwan's Environmental Protection Agency to recruit a group of 70 volunteers to patrol industrial areas and report violations of the country's strict waste disposal and recycling rules. The effort is supported by emerging environmental activism among the populace at large. (August 2005) Ref. 1331

**Vietnam Cracking Down on Environmental Violators**

Over the past several months, Vietnamese authorities have taken strong measures against some environmental polluters, and the Minister of Natural Resources and Environment has ordered the government to get tough on polluters, levied heavy fines on one factory, and threatened criminal prosecutions. The country is having a hard time, however, in balancing the need for cleaning up its environment with the necessity of attracting and keeping industrial development. (November 2008) Ref.1332

**Preparatory Process Started for the EfE 6th Ministerial Conference**

The 6th Ministerial Conference "Environment For Europe" (EfE) will take place at Belgrade in October 2007. The international preparatory process started officially with the 1st session of the Working Group of Senior Officials (WGSO) held in Geneva, 12-13 October 2005. The United
Nations Economic Commission for Europe (UNECE) Committee on Environmental Policy (CEP) proposed reviewing issues such as sustainable development, energy, EU enlargement, coordination and implementation of UNECE Conventions, and closer links to other international processes (environment and health, in particular). The European ECO-Forum (a pan-European coalition of more than 200 environmental citizens' organizations) suggested an “action-oriented” review of implementation of several strategies and protocols (including the Protocol on Strategic Environmental Assessment, and the Protocol on Pollutant Release and Transfer Registers). The next meeting of the WGSO will be in June 2006. (October 2005) Ref. 1333

**Space Technology**

*Increasing Capacity of Space Technology to Assist Environmental Security*

*Global Earth Observing System of Systems*

*NASA's Eyes in the Sky to Help Global Conservation*

*Open Skies Treaty may also Serve Environmental Agreements*

*European Geosciences Union General Assembly*

*Enhanced environmental legislation enforcement by improved coordination of global Earth observation*

*International Agreement on Earth Environmental Observing System*

*Better Use of Satellites to Monitor International Treaties*

*US National Ecological Observatory Network (NEON) Regional- and Continental-Scale Ecological Monitoring System Proposal*

**Increasing Capacity of Space Technology to Assist Environmental Security**

The global environmental monitoring system is becoming increasingly capable of detailed diagnosis. The mission of the Aura spacecraft launched by NASA is to give scientists information on the nature and movements of pollutants and their effect on the atmosphere and the ozone holes. Over the next several years four more U.S. and French satellites should be launched, forming a set of environmental monitors. Global Earth Observation System of Systems (GEOSS), a new collaboration between 17 U.S. federal agencies and nearly 50 countries will monitor data from thousands of manned and unmanned land, air, and sea stations from around the world as well as from space for a continuous assessment of the earth's vital signs. The National Oceanic and Atmospheric Administration leads the effort. The coalition members are scheduled to release a 10-year plan in February 2005. Global Monitoring for Environment and Security (GMES) launched a new *Observing the Earth* Portal to better highlight GMES’s global monitoring activities and results. (July 2004) Ref. 1334

**Global Earth Observing System of Systems**

*International Agreement on Earth Environmental Observing System*

At the second Earth Observation Summit on 25 April 2004, in Tokyo, representatives from 47 countries approved the framework document for implementing the observation plan, including the measures and goals for an observation network to be set up in ten years from 2005. According to a news agency report, "The document adopted nine goals for observation, including minimizing damage from natural disasters and human-induced hazards, recognising environment-related factors affecting human health and welfare, improving management of
energy and water resources, and others. The document also emphasized the importance of building up an international observation network to share information gained through satellites, observatories and ships, and to cover spots left unobserved under the current observation network." (April 2004) Ref.1335

Global Earth Observing System of Systems Gets 10-Year Mandate
At the Third Earth Observation Summit held in Brussels, February 16, 2005, representatives of 54 nations and over 40 international organizations formally adopted the 10-year plan for implementing the Global Earth Observing System of Systems (GEOSS). The plan provides a framework and institutional mechanism to connect Earth observation tools used by different nations and agencies independently. GEOSS will facilitate environmental monitoring, a better understanding of the environment and trends of change, and building of an early warning system. Part of GEOSS, the Global Monitoring for Environment and Security (GMES) initiative jointly led by the European Commission and ESA is designed to collect and manage data and information for both environment and civil security purposes. (February 2005) Ref. 1336

NASA's Eyes in the Sky to Help Global Conservation
NASA and the World Conservation Union (IUCN) signed an agreement to use the space agency's satellite system to map the earth, monitor global environment change, and help conservation efforts. Although the focus will be to discover unknown species of plants and animals and pinpoint their habitats, this is an important project for international collaboration for biodiversity protection in general. (November 2004) Ref. 1337

Open Skies Treaty may also Serve Environmental Agreements
Participants in the Seminar on the Environmental and Ecological Use of the Open Skies Regime discussed the possible use of the Treaty's system for ecological purposes, such as natural disaster cases, urbanization, and enforcement of international environmental regulations. The main purpose of the Open Skies Treaty is to enhance military transparency through observation flights, to facilitate the monitoring of compliance with existing or future arms control treaties, and to assist in conflict prevention and crisis management. The Treaty entered into force on January 1 2002, and currently has 31 States-Party, including the United States. (October 2004) Ref. 1338

European Geosciences Union General Assembly
The annual European Geosciences Union General Assembly took place in Vienna from 24 to 29 April 2005 with about 8,000 scientists presenting over 3,000 papers from the fields of Earth and planetary sciences. Space science has become essential for monitoring climate change effects, geophysical changes and pollution, and for enhancing natural hazard awareness and management. [See also above item Increasing Capacity of Space Technology to Assist Environmental Security] (April 2005) Ref. 1339

Enhanced environmental legislation enforcement by improved coordination of global Earth observation by a global data-sharing and integrated system comprising all environmental observing facilities based on land, on sea, and in space
At the Earth Observation Summit held in August in Washington, the delegates agreed to improve the access to data and exchange of information between countries and organizations and enlarge it towards a more encompassing global partnership. A 10-year Implementation Plan based on
better use and coordination of existing systems and initiatives will be prepared. Its framework will be presented at the 2004 Ministerial Conference to be held in Tokyo and the Plan itself at the Ministerial Conference to be hosted by the European Union towards the end of 2004. (April 2004) Ref.1340

At a Cape Town meeting, government officials and scientists from over 30 countries agreed on the framework document prepared by the Group on Earth Observations (GEO), that stipulates the mechanism of the global data-sharing system. The document details the ten-year effort to implement the integrated system comprising all environmental observing facilities, linking together thousands of earth observation facilities based on land, on sea and in space. Signing is scheduled for the framework document in Tokyo at the end of April, and for the detailed 10-year implementation plan in Brussels in February 2005. (March 2004) Ref.1341

**International Agreement on Earth Environmental Observing System**

At the second Earth Observation Summit on 25 April in Tokyo, representatives from 47 countries approved the framework document for implementing the observation plan, including the measures and goals for an observation network to be set up in ten years from 2005. According to a news agency report, "The document adopted nine goals for observation, including minimizing damage from natural disasters and human-induced hazards, recognising environment-related factors affecting human health and welfare, improving management of energy and water resources, and others. The document also emphasized the importance of building up an international observation network to share information gained through satellites, observatories and ships, and to cover spots left unobserved under the current observation network." (August-September 2003) Ref.1342

**Better Use of Satellites to Monitor International Treaties**

The Treaty Enforcement Services using Earth Observation (TESEO) was established two years ago by the European Space Agency (ESA) to help monitor international treaties and bring together agencies and organizations that otherwise do not usually collaborate. The international conventions involved in the TESEO effort range from monitoring wetlands and ensuring compliance with Kyoto Protocol emission targets to combating desertification and preserving World Heritage sites and protecting gorillas in east and central Africa. Several pilot projects have already begun. (March 2003) Ref. 1343

UN agencies and conventions’ secretariats met to at the European Space Agency’s (ESA’s) offices in Frascati to determine how to make better use of satellite imagery. According to ESA, it is possible that the initiative will be folded into the upcoming Global Monitoring for Environment and Security (GMES) initiative sponsored by ESA and the European Commission; however, some ongoing projects (including the Kyoto inventory) will continue as independent activities. (March 2003) Ref. 1344

**US National Ecological Observatory Network (NEON) Regional- and Continental-Scale Ecological Monitoring System Proposal**

The National Science Foundation has proposed formation of a new US network of research sites that would facilitate scientific cooperation on regional- and continental-scale ecological monitoring. The National Ecological Observatory Network (NEON) would focus on issues such
as biodiversity, climate change, emerging infectious diseases, invasive species, and land use. As proposed by NSF, 17 NEON observatories would be built over the next 7 years — one for each major US eco-region. These observatories would link existing ecological research sites. But a Sept. 17, 2003, report by the National Research Council challenged the eco-regional approach. Debate over the approach may soon be resolved by Congressional funding. (October 2003) Ref. 1345

**INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS**

International standards and agreements for better information sharing and integration are increasing the capacity of enforcing and complying with environmental conventions.

UNEP points out an increased participation by industry in the adoption of voluntary standards that take into account environmental considerations (i.e. through a partnership with some 300 financial and insurance institutions worldwide.)

**New Standard-setting Instruments Adopted at UNESCO’s General Conference**

UNESCO’s General Conference 32nd session adopted five standard-setting instruments, including a Declaration Concerning the Intentional Destruction of Cultural Heritage. Although not a binding instrument, the declaration covers situations of both peace and war; and of international and non-international conflicts (including instances of occupation); It also calls upon States to “take all appropriate measures to prevent, avoid, stop and suppress acts of intentional destruction of cultural heritage, wherever such heritage is located” and cooperate with each other and raise public awareness regarding this issue. The other four instruments adopted are: the International Convention on the Preservation of the Intangible Cultural Heritage; the International Declaration on Human Genetic Data; The Recommendation on the Promotion and Use of Multilingualism and Universal Access to Cyberspace; and The Charter on the Preservation of the Digital Heritage. (October 2003) Ref.1347

**International S&T Information System Proposed**

To help resolve the conflict between protecting intellectual property rights and maximizing social benefits from public investments in research around the world, the International Council for Science's (ICSU’s) Committee on Data for Science and Technology (CODATA) has proposed the Global Information Commons for Science Initiative. This initiative was launched at the World Summit on the Information Society held this month in Tunis, Tunisia, after being formulated at ICSU's annual meeting held in October, in Suzhou, China. The international S&T information system would help develop and implement “new policy guidelines and legal structures that will promote collaboration in a variety of research domains... [and could produce] a productive balance between private research and development, and publicly funded open science,” says Paul David, an economist at Stanford University. (November 2005) Ref. 1348

**New Standards for Handling Robotic Environmental Equipment**

ASTM International has released a new standard, ASTM E2592-07 - “Standard Practice for Evaluating Cache Packaged Weight and Volume of Robots for Urban Search and Rescue”, that lays out specific ways to describe requirements for the storage, shipping and deployment of
urban search and rescue robots. These recommendations apply equally well to the handling of robotic devices for environmental assessment and cleanup. (February 2008) Ref.1349

**Chemical Emission Certification Extended to Electronic Devices**
GREENGUARD Environmental Institute (GEI), the country’s largest certifier of chemical emissions from building products and furnishings, is expanding its certification efforts to include computers and other electronic devices. According to an Institute announcement, “The GREENGUARD program measures chemical ‘outgassing’ of the product during normal use and operation. Measured emissions are then compared to an extensive list of publicly available short term and long term health risk exposure levels available from the US Environmental Protection Agency, Occupational Safety Health Administration, the state of California, and CDC’s Registry of Toxic Substances.” (March 2008) Ref.1350

**UNESCO Draft Declaration on Bioethics and Human Rights**
UNESCO has issued a draft declaration that sets universal ethical guidelines for governments to consider ethical and human rights in science and technology (S&T) policymaking. It covers aspects of human rights, biodiversity, rights of indigenous people, and respect for traditional local resources and knowledge systems. The declaration suggests setting up ethics committees at different levels to assess scientific developments and encourage transparency and public participation in bioethics issues discussions. The draft declaration will be submitted for approval by all 192 UNESCO member states in October. (July 2005) Ref. 1351

**New ISO Standard on Sustainable Building**
ISO 21930:2007—Sustainability in Building Construction -- Environmental Declaration of Building Products complements ISO 14025 for the environmental product declarations (EPD) of building products, containing specifications, principles, and requirements, to encourage sustainable building. It sets the framework for environmental declarations of building products and takes into consideration the entire life cycle of a building. (December 2007) Ref.1352

**OECD Strengthens Environmental Standards for companies bidding on contracts to build civil infrastructure projects around the world**
The OECD nations have agreed to strengthen environmental standards for companies bidding on contracts to build civil infrastructure projects around the world with funding from export credit agencies. While the new guidelines would not necessarily be as stringent as those of the United States, officials said they would force firms bidding on infrastructure contracts to abide by far tougher environmental rules than they do now. (December 2003) Ref.1353

**NAFTA is Reviewing its Environmental Side Accord**
The NAFTA Commission for Environmental Cooperation (CEC) announced the review of the operations and effectiveness of the North American Agreement on Environmental Cooperation (NAAEC). The Ten-year Review Assessment Committee (TRAC) will assess the implementation of the NAAEC over the past ten years, examine the CEC and its programs, evaluate how the organization has addressed the environmental impacts of NAFTA, and suggest a roadmap of recommendations for the CEC over the next decade. The draft report will be circulated for public comment before the final report is delivered to the Council in spring 2004. (October 2003) Ref.1354
Green Standards to Counter E-waste
In view of e-waste being the fastest growing category of waste, Greenpeace launched a new e-waste campaign on August 25th. In a preamble to the campaign, it compiled data on progress in eliminating hazardous chemicals and in recycling policies of the main mobile phone and PC-makers and ranked the companies based on their scores. The criteria used in the Greenpeace assessment are tougher than those stipulated by the European Restriction of Hazardous Substances (RoHS) directive, including polyvinyl chloride (PVC) and some brominated flame retardants (BFRs) on the restrictions list. Greenpeace also advocates the “precautionary principle”, requesting companies to avoid chemicals with uncertain environmental impacts. [See also RoHS Closer to Deadline in May 2006, Recycling Regulations in the EU in August 2005 and Two E-waste laws entered into force in the EU in February 2003 environmental security reports.]

The Electronic Product Environmental Assessment Tool (EPEAT) produced by EPA also aims to encourage “green computers.” After working for three years with major computer manufacturers, EPA produced a "greener computers" list that consumers can consult to see what models are more environmentally friendly and why. The standards were developed by the Institute of Electrical and Electronics Engineers and consider 23 required criteria and 28 optional criteria in eight categories, including: content of environmentally sensitive materials (such as mercury, lead and cadmium); power requirements; lifespan; and the "end of life" recycling plans offered by the manufacturers. (August 2006) Ref. 1355

ASTM Issues Standard Terminology for Nanotechnology
The American Society for Testing Materials (ASTM) International Committee E56 on Nanotechnology has approved its first standard, E 2456, Terminology for Nanotechnology, under the jurisdiction of Subcommittee E56.01 on Terminology and Nomenclature. (December 2006) Ref. 1356

ANSI to Carry Out Survey on Needs for Nanotech Standards
The American National Standards Institute (ANSI) has announced the initiation of a survey developed by the U.S. Technical Advisory Group to ISO Technical Committee 229—Nanotechnologies. According to the ANSI announcement, "Input from the survey will help to shape the U.S. position on international standardization activities in nanotechnology. The survey asks U.S. industry stakeholders to identify market needs and areas of standardization that they believe will lead to the commercialization of nanotechnology applications. The ISO effort currently focuses on three main areas: terminology and nomenclature; metrology and instrumentation . . .; and science-based health, safety and environmental practices." [See also ISO to Establish Standardization in the Field of Nanotechnologies in the October 2005 environmental security report.] (April 2006) Ref. 1357

ISO to Establish Standardization in the Field of Nanotechnologies
The International Organization for Standardization established in June 2005 the Technical Committee for Nanotechnologies (ISO/TC 229) with Chair and Secretariat in the UK. The scope of ISO/TC 229 is to produce standards for “classification, terminology and nomenclature, basic metrology, characterization, including calibration and certification, risk and environmental issues.” The first meeting of the new Committee will be held on 9-11 November 2005 in
London, organized by the British Standards Institution (BSI). (October 2005) Ref. 1358

**China Creates World's First National Standards for Nanotechnology**
The first national standards for nanomaterial in the world will come into effect in China on April 1st. Research on 15 nanomaterials standards is underway, but, so far, seven items are included: a Glossary, four standards for nanoproducsts (nickel powder, zinc oxide, titanium dioxide, and calcium carbonate), as well as two for testing of gas adsorption BET and the granularity of nanopowder. (March 2005) Ref. 1359

**SAFETY ISSUES**

The accelerating rate of technological change has fundamentally changed the spectrum of threats to the environment and human health, such as e-waste, possible risks of using nanotechnology and biotechnology, use of chemicals, and the spread and safety of nuclear, chemical, and biotechnology labs.

**CHEMICAL AND BIOLOGICAL SAFETY ISSUES**

*Pathogens can be easily transferred. ... So scientists must be made aware of the ethical importance of their work.*

Francesco Quattrini, Swiss Foreign Ministry official, supporting a proposed international code of conduct for scientists as a measure aimed at preventing biological terrorism

Although laboratory biosafety standards exist, there is no international treaty governing their use and there is no uniformity of application or compliance requirements. Bioscientists from around the world began discussions on establishing international biosecurity measures along with standards and protocols that would lead to improved security of facilities conducting infectious disease research worldwide.

**Some Chemical and Biosecurity Issues**

Reportedly, the al-Qaeda cell that shut down operations in the Tizi Ouzou province in Algeria after an accident might have been developing chemical and biological weapons. Last year, it was reported that allegedly up to 100 potential terrorists had attempted to enter postgraduate programs in Britain to gain access to laboratories. Experts and security organs repeatedly warn that the security measures to stop eventual development and use of such weapons by terrorist groups are insufficient and inadequate.

Six-legged Soldiers: Using Insects as Weapons of War by Jeffrey A Lockwood warns about the possibility of terrorists developing an insect-based weapon and conducting a biological attack more easily than a chemical or nuclear strike. He therefore urges governments to create an effective “pest management infrastructure” able to detect insects carrying a deadly disease. Countries with inadequate safety standards for pharmaceutical and food production combined with insufficient import verification mechanisms open a new avenue for terrorist activity. In an increasingly globalized world with greater access to S&T knowledge and software, international standards, information-sharing agreements, common ground for cooperation with the local
authorities, improved inspections and testing systems, and stronger and more comprehensive import safety regulations (especially for pharmaceutical and food production) are needed. [See also Better International Controls Needed to Prevent Bioterrorism in July 2006, Call for Reinforcements to Chemical Safety in September 2006, and other items on this theme in previous environmental security reports.] (January 2009) Ref. 1362

Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?
Hazardous substances such as ozone-depleting substances and toxic chemicals are increasingly profitable, difficult to tackle, and involve international organized crime. Estimates from the early 2000s suggest that 10-20% of the ozone-depleting substance trade was illegal (a value of $25-60 million). The Basel Convention estimates international hazardous waste movement to be at least 8.5 million tonnes per year. Although it is difficult to estimate the illegal portion of this, a project undertaken in 13 European countries found that over 50% of the waste shipments examined were illegal. One could imagine higher percentages in countries with fewer inspection capabilities and in failed states. E-waste (electronic waste, some of which is hazardous) is growing worldwide. About 70% of it is dumped in developing countries in Asia and Africa. At a recent high-level meeting on enforcement issues held by the World Customs Organization, representatives of the United Nations Environmental Programme (UNEP), customs administrations, and other interested organizations agreed on an Action Plan to improve enforcement and tackle increasing environment crime. The Plan calls for increased detection efficiency by customs offices, creation of environmental crime units, and international co-operation and information exchange. (April 2008) Ref. 1363

Toxicogenomics Risk Assessment
The Use of Toxicogenomics to Understand Toxic Effects and Improve Risk Assessment workshop held by the U.S. National Research Council, Committee on Emerging Issues and Data on Environmental Contaminants, sought to identify how current toxicogenomic information can be used to inform risk assessment today and to identify toxicogenomic research directions to facilitate risk assessment in the future. Two chemicals of regulatory and scientific interest, dibutyl phthalate and benzene, were used as case studies to highlight the current use, controversies, and potential for using toxicogenomic information in risk assessment. (November 2006) Ref. 1364

Human Biomonitoring for Environmental Chemicals
This is an independent study by the National Research Council (NRC) of the National Academies to address the challenges related to biomonitoring, including improving biomonitoring systems, interpreting the results of biomonitoring data to the public health, addressing ethical uses of the data, and communicating the results of biomonitoring to different forums. The report recommends improving the interpretation of biomonitoring results by expanding the scientific database on many chemicals; better coordination between biomarker development and population biomonitoring and the potential health implications; improved ability to assess the real health risks of detected chemicals; development of strategies for efficient communication of biomonitoring studies' results; and a review of the bioethical issues concerning biomonitoring, including confidentiality and reporting. (November 2006) Ref. 1365
Scientific Community’s Questions Concerning Biodefense Standards
The American Type Culture Collection (ATCC) convened an Expert Panel on the Development of Standards for Biodefense in Washington, DC, 5-6 April 2006. Considering the critical point reached in the evolution of the biodefense industry, the scientific community agreed that standards are needed to accelerate product development for biodefense-related diagnostics, therapeutics, and reagents. However, on debating the standards issue, a panel of experts generated a range of questions that still require resolution in several areas, including standard handling protocols—that would include protocols for handling, storage, transport, inactivation, and disposal of biomaterials. [See also Better International Controls Needed to Prevent Bioterrorism in July 2006, Assessment and Recommendations for Biosecurity in June 2006, and Recommendation for a Biosecurity Watchdog in February 2006 environmental security reports.] (August 2006) Ref. 1366

Proceedings of the Workshop Risk, Uncertainty and Decision Analysis for Environmental Security and Non-chemical Stressors
The workshop “Risk, Uncertainty and Decision Analysis for Environmental Security and Non-chemical Stressors” was held April 26-29, 2007 in Lisbon, Portugal. The objective of the workshop was to explore how to improve risk assessment and modeling for non-chemical environmental stressors by adapting chemical risk assessment approaches and tools. The outcomes of the workshops were not available at the time of this writing. (April 2007) Ref. 1367

World network of regional CDC-like organizations proposed for combating the effects of bioterrorism
During the EU/US Symposium: Transatlantic Cooperation on Combating Bioterrorism held November 24, 2003 at the Embassy of Italy in Washington, DC, the idea of a world network of regional CDC-like organizations was proposed as a necessary element of combating the effects of bioterrorism on the general public. Initially a European CDC was proposed, but since a global system is really required, the conversation quickly moved to suggesting one for each region of the world. (November 2003) Ref.1368

Soviet-Era Anti-plague Institutes Still Pose Environmental Threat
The United States has an extensive program aimed at minimizing the possible transfer and misuse of Soviet WMD R&D. One area that has fallen through the proverbial crack, however, is the collection of more than 80 anti-plague institutes, which were not a formal part of the Russian biowarfare program and therefore are not covered by the DOD Threat Reduction effort. These establishments, located in all parts of the FSU, still work with extremely hazardous pathogens under totally inadequate physical and biological security. This incredibly dangerous situation is described in a draft report from a major investigation by scholars from the Center for Nonproliferation Studies at the Monterey Institute of International Studies. (August 2005) Ref.1369

Russia to Destroy All Chemical Weapons Arsenal by 2012
The Russian government approved a plan to destroy its chemical weapons arsenal by 2012, reported Agence France-Presse in Moscow. Under the proposal, 20% of Russia’s 40,000 ton chemical weapons stockpile would be destroyed by 2007, 45% by 2009, and all of it by 2012, meeting its commitment under the Chemical Weapons Convention. “Even though it has the
The biggest chemical weapons stockpile in the world, Russia has also come up with the safest technologies for disarmament,” said Viktor Khristenko, Russia’s Industry and Energy Minister. Out of the $6 billion program, foreign countries are expected to cover $385 million. Final approval by the Russian government of the chemical weapons disarmament plan is expected before August 15. (July 2005) Ref. 1370

Japanese Chemical Weapons Cleaning in China Yet to be Completed
June 2007 was the deadline agreed to by Chinese and Japanese authorities for cleaning up the Japanese chemical weapons littering China since the Japanese war against China. Yet, this month, a number of Chinese construction workers suffered health problems after being exposed to a ruptured mustard agent bomb believed to have been dropped by a Japanese warplane many years ago. The unexploded bomb was hit by the construction team while excavating for a residential building in Bayannaoer City in Inner Mongolia. The Japanese government is expected to receive a request to destroy the weapon, sources said. In May 2007, Japan’s Supreme Court ruled that Chinese victims of Japanese biological warfare and other atrocities that occurred before and during World War II are not eligible for compensation. (June 2007) Ref.1371

Discussions over World War II Japanese Warfare Program in China not Settled Yet
The chemical weapons left over by the Japanese invading army during World War II are still realistic threats to the Chinese people and environmental security, say Chinese officials urging Japan to take more measures to accelerate the process of destroying them. Chinese Foreign Ministry spokesman Liu Jianchao demands that the Japanese government follow the Convention on the Banning of Chemical Weapons and the memorandum on the destruction of chemical weapons reached between the two governments.

Recently, Japan rejected China’s demands for apology and compensation for damages caused by the Japanese germ warfare program during World War II. Chinese Foreign Ministry said, “Germ warfare was one of the serious crimes of the Japanese militarist period during World War II… The Japanese government should properly deal with this problem by using an honest attitude, undertaking its full responsibilities and handling conscientiously the reasonable demands of the injured people.” The lawsuit has uncovered information about Japan’s biological warfare program kept secret by Japan’s government and the United States following World War II, says the Associated Press. For instance, the Unit 731 base near the Chinese city of Harbin may be responsible for as many as 250,000 deaths in the 1930s and ’40s during the Japanese occupation of China. [See also China: Japan to Pay $2.7 Million for War Gas Leak in October 2003 and Effects of Poison Gas Used in WWII by Japan in May 2003 environmental scanning reports] (July 2005) Ref.1372

EU and Japan Respond to Risks from Low Dose Chemicals
A series of articles by Peter Waldman in the Wall Street Journal have brought to attention new scientific studies which have indicated that exposure to extremely low levels of certain industrial chemicals, even a few parts per trillion, can have harmful biological effects. Many of these results are controversial, and disputed by manufacturers and users. Compounds include bisphenol A, phthalates, and perchlorates. The EU and Japan are taking measures to impose stricter controls or outright prohibitions on such materials, and are conducting further investigations. (August 2005) Ref. 1373
Citation Statistics May Reveal Covert Weapons Work
A team at the NM Institute of Mining & Technology has reported, in Nature, a statistical technique for using the interlocking network of authors and citations among scientific papers to detect covert research projects. Applying the method to a Soviet laboratory’s body of publications, the scientists were able to detect a 10-year period during which it was engaged in bioweapons studies. (June 2004) Ref. 1374

Chemical Munitions on San José Island, Panama
Several chemical munitions have been found recently on San José Island, Panama, a chemical weapons testing site up to 1948. Although the US has offered to dispose of the munitions found to date and provide funding for the equipment needed for any further cleanup, Panama has been unwilling to release Washington from further responsibility. Since the Panamanian government has refused the offer, the US government considers the matter closed. (August 2004) Ref.1375

Bioterrorism and Epidemics Threats

Terrorists Could Tap Pharmaceutical Toxins
*Old Plagues, New Threats* by the Cooperative Nonproliferation Program at the Stimson Center is a comprehensive analysis of the state of monitoring and regulation of emerging products and technologies. It uses the pharmaceutical industry as a case study and outlines the threats—from research and distribution to injection into patients of products derived from select agents. The growing interest in dangerous pathogens and toxins increases the potential of their use in biological weapons by nefarious actors. Lack of adequate regulations increases the possibility of such scenarios. [See also *Accelerating Synthetic Biology Applications Need Better Monitoring and Regulation* in July 2007 and other similar items in previous environmental security reports.](#) (April 2008) Ref. 1377

African Countries are Vulnerable to Bioterrorism
African science policy should give higher importance to the threat posed by biological weapons, according to an international meeting of representatives from the fields of science, law, and security, held in Kampala, Uganda, this month. Africa is vulnerable to bioterrorism; it lacks the institutions, technology, and expertise to protect its citizens from biological terrorism. Science and technology policy of African countries should simultaneously enhance biological research for eradicating diseases and assure strict security measures to prevent access to material eventually usable in bioterrorism. Because there is little scientific awareness in both the political leadership and cultures of African countries, it will be necessary to improve public understanding of science. The meeting was organized by the Kampala-based International Law Institute (ILI) and the US-based International Consortium for Law and Strategic Security (ICLSS). (October 2005) Ref. 1378

UN Report Recommends New Powers to Combat Bioterrorism and Epidemics
The UN report *A More Secure World: Our Shared Responsibility* recommends expansion of the UN’s capacity to investigate and intervene in a country when a suspicious disease outbreak occurs, whether the epidemic has a natural or terrorist origin. The Security Council should cooperate with the WHO to respond to and support international action including "cordon
operations" for quarantine and international public health access. If existing International Health Regulations (IHR) “do not provide adequate access for WHO investigations and response coordination, the Security Council should be prepared to mandate greater compliance.” The report's recommendations will be considered at the fall summit of Heads of State. The eventual changes required to IHR—the rules that govern the WHO—might get to a vote in May. Note: The recommendations might get serious support, in light of governments’ response times to cases of SARS in 2003 and recent avian flu outbreaks. (February 2005) Ref.1379

**Interpol Warns World Unprepared for an Eventual Bio-terrorist Attack**

Interpol chief Ronald Noble warns that there is substantial evidence of a possible biological attack by Al Qaeda, “which could cause contagious disease to be spread,” and “no entity in the world is prepared for it.” Some 400 police officers and health officials from around the world will attend a bio-terrorism conference organized by Interpol beginning March 1, in Lyons, France, to improve cooperation and information sharing between intelligence agencies and police departments to better combat bioterrorism threats. (February 2005) Ref.1380

**New NAS Website on Biosecurity**

The Policy and Global Affairs division of the National Academy of Sciences launched a new website that is a collection of resources, studies and other activities at the National Academies related to biosecurity. So far, the categories are: biosecurity, publications, reports in preparation, and other activities. (November 2004) Ref.1381

**Bioterrorism Via Smuggled Ebola-contaminated Bushmeat from Africa**

Underground networks of African poachers have been selling illegal bushmeat for decades. Might these networks be contacted one day by bioterrorists? Experts speculate that Ebola-contaminated bushmeat could be smuggled into a country by bioterrorists to trigger an Ebola outbreak. The World Health Organization (WHO) and Médecins Sans Frontières (MSF) are currently working in Gabon and the Congo with active cases of Ebola. (January 2005) Ref.1382

**Russia No Longer Funding Bioterrorism Countermeasures Research**

Lev Sandakhchiyev, Director General of the Vektor State Science Center of Virology and Biotechnology in Novosibirsk, announced that from 2005 Moscow would not fund any more research for biological terrorism countermeasures, Interfax reported on February 1, 2005. “Russia has effectively wound up its program to develop protection against pathogens” said the Russian scientist, and he added that there are no “real, constructive programs” among Russia, the U.S. and Europe for cooperating to counter the threat of biological terrorism. (February 2005) Ref.1383

**Bioterrorism, Preparedness, Attack and Response 4**

This new book edited by: John Blair, Texas Tech University, Lubbock, Texas; Myron Fottler, University of Central Florida, Orlando, Florida, and the Hon. Albert C. Zapanta, Office of the Secretary of Defense, Pentagon, reviews how bioterrorism could affect the healthcare system of the United States. The book gives one of the broadest overviews of the issues of bioterrorism preparedness thus far.

Contents:

Part I: Biological Agents and Terrorist Agents
The Millennium Project

Emerging Environmental Security Issues

The Bioterrorism Formula: Facing the Certainty of the Uncertain Future; The International Threat of Biological Weapons: Legal and Regulatory Perspectives; Cocktails, Deceptions and Force Multipliers in Bioterrorism; Modeling the Environmental Jolt of Terrorist Attacks: Configurations of Asymmetrical Warfare;

Part II: Chaos, Complexity and Change
Chaos and Complexity in a Bioterrorism Future; The Environmental Jolt of Likely Bioterrorism; Changing Organizations for Their Likely Mass-Casualties Future.

Part III: Organizations Respond? or Not

Part IV: Defending the Homeland: Changes and Challenges
The Role of the Reserve Forces in Defending the Homeland; Civil-Military Relations in an Era of Bioterrorism: Crime and War in the Making of Modern Civil-Military Relations; Integration or Disintegration? An Examination of the Core Organization and Management Challenges at the Department of Homeland Security. (September 2004) Ref. 1384

Nuclear Safety

Nuclear and biological threats remain on the international agenda as top issues without clear solutions. Although negotiations of the Nuclear Non-Proliferation Treaty did not make progress over the past few years, there was progress in some related areas. The International Convention for the Suppression of Acts of Nuclear Terrorism, adopted by the General Assembly in April 2005, creates an enforced legal framework to counter nuclear terrorism. The Conference on Topical Issues in Nuclear Safety, held in October 2004 in Beijing, recommended that the IAEA develop a single set of international standards for all nuclear installations—from design to decommissioning. Given the growing diversification and globalization of the industry, the sooner these standards are developed and implemented, the better.

Nuclear Security Addressable only Internationally
The head of the National Nuclear Security Administration, Thomas D'Agostino, said that the international community should agree on a common set of security standards to prevent the spread of WMD and terrorists or rogue nations acquiring sensitive materials. “Let me be clear when I say I believe the United States has a special responsibility in advancing nonproliferation and global security. But we should not and cannot do it alone,” he said. One important player might be the World Institute for Nuclear Security. The Institute formally opened its doors on September 29, 2008 in Vienna, Austria.

Meantime, a new disarmament study, Abolishing Nuclear Weapons, by the International Institute for Strategic Studies, examines the steps needed for ‘getting to zero’ and criticizes leaders advocating nuclear disarmament while “none of these states has an employee, let alone an interagency group, tasked full-time with identifying what would be required to verifiably
decommission all its nuclear weapons.” [See also Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction in July-August 2008, and other related items in previous environmental security reports.] (September 2008) Ref. 1386

**International Nuclear Safety Regime Review**

“A Guide to Global Nuclear Governance: Safety, Security and Nonproliferation” is a review of international agreements and bodies addressing nuclear safety and security issues around the world. The report was prepared by the Canadian Centre for International Governance Innovation and is intended to be followed next year by a report of recommendations to improve international monitoring of nuclear material and combat proliferation. (September 2008) Ref. 1387

**Nuclear Theft, Smuggling, and Sabotage Countermeasures**

The recent conference on strengthening nuclear security held in Vienna, Austria, 4–8 July, 2005 adopted Amendments to the Convention on the Physical Protection of Nuclear Material (CPPNM). The original CPPNM applied only to nuclear material in international transport. The amendments substantially strengthen the Convention by providing an expanded system for preventing, combating and punishing nuclear material theft, smuggling and sabotage. The amendments also request expanded cooperation among States regarding rapid measures to locate and recover stolen or smuggled nuclear material, to mitigate any radiological consequences of sabotage, and to prevent and combat relevant offences. The new rules will come into effect once they have been ratified by two-thirds of the 112 States Parties of the Convention. This is expected to take several years. (July 2005) Ref. 1388

**UN Agency to Intensify Tracking of Illicit Nuclear Trafficking**

At its 48th General Conference, IAEA warned that nuclear and radiological terrorism didn’t diminish in spite of the efforts to expand and accelerate preventive actions. The IAEA Illicit Trafficking Database includes about 600 illicit incidents involving unauthorized acquisition, possession, use, transfer, or disposal of nuclear material and/or other radioactive or dangerous material. Non-participating States are encouraged to join the 80 Member States to increase the program’s efficiency. (September 2004) Ref. 1389

**SIPRI Year Book 2007 Points out Environmental, Nuclear, and Energy Threats**

The 2007 edition of the authoritative Stockholm International Peace Research Institute (SIPRI) Yearbook, along with statistics on conflict and weapons expenditure, highlights the main categories of threats to peace that the world faces. Among the main threats, it lists: energy, which “could become a weapon”; and the environment, highlighting that “Using the world’s resources to address hunger, environmental factors and poverty is likely both to improve human survival and to strengthen international security.” Concerning nuclear, chemical and biological threats, the report warns on high uncertainties of the stockpiles and research around the world and calls for increased transparency and better policies for risk assessments and risk-remediation strategies. (June 2007) Ref. 1390

**Reports Addressing Nuclear Safety**

*Nuclear Security Report 2007; Measures to Protect Against Nuclear Terrorism* outlines concerns and strategies to consider in order to improve international nuclear security, mainly based on international collaboration. *Securing the Bomb 2007*, commissioned by the Nuclear Threat
Initiative, provides a comprehensive assessment of vulnerable nuclear stockpiles around the world and makes recommendations for reducing the nuclear terrorism threat, including establishing a database with unclassified information on actual nuclear incidents. IAEA Illicit Trafficking Database reveals that in the period 1993–2006, the agency confirmed 275 cases of illicit possession and connected activities involving nuclear materials and radioactive sources. (September 2007) Ref.1391

According to announcements, the US National Research Council has released a report, Radiation Source Use And Replacement, that “examines the use of high-risk radioactive materials [e.g. cesium chloride] found in medical and research equipment that could be accidentally dispersed or utilized to make a dirty bomb in a terrorist attack.” It also “identifies lower-risk alternatives that would not change the performance of the devices, and recommends options to remove and replace the high-risk sources.” The National Research Council recommends that U.S. research and medical facilities reduce their use of devices containing cesium chloride and urged U.S. officials to “stop licensing the cesium chloride irradiators, halt their import and export and promote decommissioning of existing machines.” [See also Millennium Project’s January 2003 report on this issue: Commercial radioactive components recognized as “dirty bomb” hazard.] (February 2008) Ref.1392

Monitoring Nuclear Weapons and Nuclear-Explosive Materials, a new report by the Committee on International Security and Arms (CISAC) of the National Academy of Sciences (NAS), outlines technical and collaborative approaches that could help policy-makers minimize the proliferation of nuclear weapons, prevent terrorists from acquiring them, and reduce risks posed by existing nuclear arsenals. The report emphasizes that transparency, monitoring, and verification of all categories of nuclear weapons and material are crucial. It also addresses some of the institutional and technical approaches related to these issues. However, it doesn’t make recommendations on policy or action priorities. There are 30,000 existing nuclear weapons in the world of which the U.S. and Russia possess 95%. Nevertheless, the report notes “enough additional nuclear-explosive material exists in military and civil nuclear facilities worldwide to make something like 100,000 additional nuclear weapons”, possibly by non-nuclear weapon states and/or terrorist groups.

Another NAS report, Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report addresses the safety issues of spent nuclear fuel storage at commercial nuclear reactors. It makes recommendations to the U.S. Nuclear Regulatory Commission on measures to reduce terrorist attack possibilities, as well as implementation of these measures. It calls for plant-by-plant vulnerability analyses and prompt communication of the results for timely implementation of the measures to reduce potential risks.

Policy-makers, industry representatives, and experts representing the world's nonproliferation and nuclear power communities gathered for the 14th International Security Conference organized by Sandia National Laboratories on April 4-6 near Washington, D.C. to bolster discussions about the nuclear fuel cycle and strategies to reduce proliferation risks involving civilian nuclear fuels. (April 2005) Ref.1393

**Multilateral Approach Needed To Keep Nuclear Arms from Terrorists**

Multilateral Approaches to the Nuclear Fuel Cycle, a study carried out by a group of experts...
from 26 countries at the request of the International Atomic Energy Agency (IAEA), concluded that multilateral cooperation is essential for curbing “burgeoning and alarmingly well organized nuclear supply networks, and from the increasing risk of acquisition of nuclear or other radioactive materials by terrorist and other non-State entities.” The report suggests multilateral arrangements—by region or by continent—to strengthen controls over fuel manipulation, transparent fuel movement, enrichment, reprocessing and disposal and storage of spent fuel. The study is now widely circulated and will be discussed at the Nuclear Nonproliferation Treaty (NPT) Review Conference in May. International cooperation was also the call of UN Secretary General Kofi Annan at the 41st Conference on Security Policy held in Munich this month.

IAEA Director, Mohamed ElBaradei, warned that terrorist groups might have already obtained a nuclear weapon, or the material necessary to create one. He is proposing seven measures to strengthen the NPT, which will be presented at the May NPT Review Conference, including a five-year moratorium on construction of uranium enrichment facilities.

In the meantime, nuclear materials are moving around without control. Indian Police found weapons-grade uranium on two men who were arrested on suspicion of being drug peddlers. 253.6 grams (8.8 ounces) of substance was identified as 99% uranium by the Bhabha Atomic Research Center. The origin and destination of the uranium are currently being investigated. Russian police seized 40 kg of uranium-238 from a person who claimed to be using it as ‘weight lifting equipment’. (February 2005) Ref.1394

**Increasing Calls for Improved Management of Nuclear Materials and Nonproliferation**

International Atomic Energy Agency (IAEA) Director-General Mohamed ElBaradei, concerned about terrorism and the proliferation of nuclear materials, urged the international community to reinforce the Nuclear Non-Proliferation Treaty (NPT) and draw a concrete roadmap and timetable for irreversible nuclear disarmament. Senator Joseph Biden (D-Del.) introduced a bill this month [January 2005] that proposed to re-establish U.S. efforts to convert Russian nuclear weapons production sites to civilian use, as part of the counterterrorism bill, Targeting Terrorists More Effectively Act of 2005. Nuclear proliferation and threats top the discussions of the Geneva Conference on Disarmament that began on January 27. The May 2005 NPT Review Conference will further discuss nonproliferation initiatives and a new disarmament action plan.

The Institute for War and Peace recently reported on a former Grozny chemical factory wrecked by war, poverty and lawlessness, where dangerous radioactive cobalt lies practically unguarded and already caused the death of several people. In Armenia, the Metsamor aging nuclear power station is a problem given its location and the need to fly in fuel on Russian planes through Georgian airspace—equivalent to “flying around a potential nuclear bomb” states Alexis Louber, head of the EU delegation in Armenia. (January 2005) Ref.1395

The menace of poor safety conditions at nuclear sites around the world persists. Recent massive landslides in Kyrgyzstan in an area with 20 neglected spent nuclear fuel depositories threaten the whole of Central Asia with nuclear ecological disaster. Furthermore, UN officials and non-proliferation experts are concerned that nuclear materials smugglers could be using the drug trafficking routes in Central Asia, exploiting the present instability in the region—such as the political turmoil in Kyrgyzstan. According to the IAEA, the disappearance of radioactive material from facilities in Central Asia after the breakup of the Soviet Union in 1991 was a “widespread phenomenon.” (April 2005) Ref.1396
**Increasing Nuclear Safety and Security**
The first International Conference on Effective Nuclear Regulatory Systems was held in Moscow, 27 February–3 March 2006. The 216 participants from 57 countries and seven international organizations discussed the full range of issues of nuclear security and safety in light of the potential revitalization of nuclear energy for meeting world energy requirements without greenhouse gas production. Triennial forums will review progress in creating effective nuclear regulatory systems and deepening international collaboration.

On March 23, Slovakia became the first country to ratify the International Convention for the Suppression of Acts of Nuclear Terrorism; to date, 100 States have signed it. [See also Nuclear Terrorism Convention Signed by 82 Countries at the UN Summit in the September 2005, and UN Agency to Intensify Tracking of Illicit Nuclear Trafficking in the September 2004 environmental security reports.](Ref. 1397)

**IAEA Annual Report for 2004**
The annual report of the UN atomic watchdog calls for global cooperation on all nuclear issues—from countering the threat of nuclear and radiological terrorism to preventing nuclear weapons proliferation, and meeting a growing energy demand. The report is a comprehensive overview of the Agency’s work in 2004 in its three main domains: technology, safety and verification, also presenting prospects for future developments. It highlights that although attention to security of nuclear and other radioactive material and associated technologies increased significantly in recent years, international cooperation is essential to strengthen all countries’ preparedness to respond properly to the threat of nuclear and radiological terrorism and to build regional and global networks for combating transnational threats. The report notes that out of the over 650 confirmed incidents of trafficking in nuclear or other radioactive material recorded since 1993, the highest number of incidents—121 (of which 11 involved nuclear material) were in 2004. The report will be presented at the IAEA General Conference to be held in Vienna beginning 26 September. Other IAEA reports and documents prepared for the Conference will be made available as they are published. (July 2005) Ref. 1398

**Non–Proliferation Treaty Deadlock Continues**
The second of three sessions of the Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non–Proliferation of Nuclear Weapons (NPT) was held from April 28 to May 9 at the UN Office at Geneva, Switzerland. Participation included delegates of 106 States parties, representatives of specialized international organizations, and of 64 NGOs. The main issues discussed included: nuclear non-proliferation, disarmament and international security; nuclear-weapon-free zones; nuclear safeguards; the peaceful use of nuclear energy; and the Middle East situation. No special agreements were reached. The third session will be held May 4-15, 2009, and the Review Conference will be April 26–May 21, 2010, both in New York. (May 2008) Ref.1399

**Australia to Propose Panel to Advance Work for the NPT Review in 2010**
Australian Prime Minister Kevin Rudd announced plans to create an International Commission on Nuclear Nonproliferation and Disarmament to make constructive recommendation for the 2010 Nuclear Nonproliferation Treaty Review Conference. The commission would follow on the work of Australian-led 1996 Canberra Commission and Japan’s Tokyo Forum. The first report of the panel is supposed to be presented at a major international conference of experts in Australia.
late 2009. [See also Non-Proliferation Treaty Deadlock Continues in May 2008 and other similar items in previous environmental security reports.] Meantime, the intergovernmental Financial Action Task Force warns that the international community is failing to efficiently control financial transactions that help fund illegal production, technology transfer, and trade of chemical, biological and nuclear weapons. Free-trade zones and transshipment hubs in the Netherlands, Singapore and the UAE are specifically vulnerable sites. (June 2008) Ref.1400

**Nuclear-Free Zones**

Nuclear-Free Zones are multiplying all over the world showing humanity’s commitment to ban nuclear weapons. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. Nuclear–free zones include the Antarctic, Africa, Latin American and the Caribbean, South Pacific, South Asia, and Mongolia. Currently Central Asia, Central Europe, South Asia and the Peninsula of Korea, and the Middle East are in negotiations for their own free zones. Ref.1401, 1402

The Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL) has presented a paper: What means Nuclear-Weapon-Free Zones? which specifies some principles to be considered in the existent and future NWFZ treaties such as: applications during wartime as well as peacetime; prohibition of peaceful nuclear tests; prohibition of military attacks on nuclear facilities of Member States; extension of denuclearization to the maritime areas adjacent to Member States; and new international enforcement mechanisms for possible cases of violating the treaties (such as the Bangkok Treaty mentions).Ref.1403

The Nuclear Nonproliferation Treaty (NPT) has 188 states parties; only India, Pakistan, Israel and North Korea are not parties to the NPT. There is international consensus that the gravity of the increasingly serious threat to the treaty and international security posed by the proliferation of weapons of mass destruction –nuclear, biological and chemical – reinforces the need to strengthen the treaty.

*Central Asia agrees to become a Nuclear Free Zone*

Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzstan and Turkmenistan agreed to become the world's next nuclear weapons-free zone after five years of negotiations. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. This is the first such agreement to be negotiated under the UN. It is expected to be signed by the end of this year. Other nuclear free zones include the Antarctic, Africa, Latin America, South Pacific, South Asia, and Mongolia. Currently Central Europe, South Asia and the Peninsula of Korea, and the Middle East are in negotiations for their own free zones. (October 2002) Ref.1404

*Cuba’s ratification of the Treaty of Tlatelolco completes Latin American and the Caribbean Nuclear Weapons Free Zone*

Cuba was the last of 33 eligible states to ratify the Treaty of Tlatelolco October 26,2002, which establishes a nuclear weapon-free zone in Latin America and the Caribbean. (October 2002) Ref.1405
Central Asia Becomes Nuclear Weapon-Free Zone
With the Kazakh Senate approving the Central Asian Nuclear Weapon-Free Zone treaty, and Kazakhstan President Nursultan Nazarbayev expected to ratify it shortly, Central Asia—including Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan—becomes a nuclear weapons-free zone, with the parties banning the possession as well as stationing of other nations’ nuclear weapons on their territories. (December 2008) Ref. 1406

U.S. and Allies Should Change Priorities, Says New Book On Terrorism
The Four Faces of Nuclear Terrorism from the Monterey Institute in California recommends new priorities based on risk (likelihood multiplied by impact) and concludes that addressing the availability of highly enriched uranium should be put at the top of the list: “The United States must dramatically revise U.S. efforts to protect fissile materials abroad so as to make securing, consolidating, and eliminating highly enriched uranium (HEU) the leading and most urgent task, taking clear precedence over addressing the dangers posed by plutonium, which must, nonetheless, remain an important priority. The overarching principal guiding policy should be to move toward a world in which fewer countries retain HEU, fewer facilities within countries possess HEU, and fewer locations within those facilities have HEU present.” (August 2004) Ref. 1407

Russia Accepts London Convention on Dumping of Radioactive Wastes
The Russian Federation announced its acceptance of the regulations that ban dumping radioactive wastes in seawater, as stipulated under Resolution LC.51(16) to the London Convention. Adopted in 1993, Resolution LC.51(16) to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, "London Convention", prohibits all forms of radioactive wastes dumping into seas (including incineration at sea of industrial wastes). The resolution is now in force for all 81 Parties to the London Convention. (June 2005) Ref.1408

A Single set of International Standards is proposed for Nuclear Power Plants from Design to Decommissioning
The Conference on Topical Issues in Nuclear Safety, with 274 delegates from 37 countries held last month [October 2004] in Beijing, recommended that the International Atomic Energy Agency (IAEA) develop a single set of international standards for all nuclear installations from design to decommissioning. Given the growing diversification and globalization of the industry, the sooner these standards are developed and implemented, the better. (November 2004) Ref. 1409

Reducing Proliferation Risks by Converting 60 High- to Low-Enriched Uranium Research Reactors Could Take 10 Years
A key to lowering risks induced by the proliferation of weapons-grade uranium is converting civil nuclear research reactors to run on low-enriched uranium (LEU) instead of high-enriched uranium (HEU). So far 31 research reactors have been converted to low-enriched uranium and 7 have been partly converted. However, IAEA estimates it could take 10 years to convert some 60 civilian research reactors that are still running on HEU that are targeted for this conversion. Approximately 200 experts from across the globe discussed these conversion issues at the International Meeting on Reduced Enrichment for Research and Test Reactors (RERTR) held in Vienna, November 8-11. (November 2004) Ref.1410
Safeguarding radioactive materials is inadequate
Possibly 100 countries may hold radioactive materials that are not safely guarded. Friedrich Steinhäusler, a physicist from the University of Salzburg in Austria and a former member of the International Commission on Radiological Protection, and scientists from Stanford University in California found gaping holes in the ability to detect nuclear smuggling, inadequate inventory of radioactive materials, and serious shortages of trained staff, equipment and resources. The countries surveyed are: the US, China, Germany, Austria, Poland, Romania, Switzerland, Israel, Brazil, Kazakhstan and Bangladesh.

Recent looting and destruction at nuclear sites in Iraq could lead to radioactive material being used by terrorists to make dirty bombs, said the International Atomic Energy Agency (IAEA) Director-General. As a result, the U.S. may welcome IAEA experts' examination of nuclear arms development sites in Iraq.

IAEA, Interpol, and the World Customs Organization conference expressed serious concerns over the “frightening picture” of easy access to radioactive material, poor border controls, inadequate monitoring equipment, and widespread smuggling. IAEA is discussing plans to strengthen the IAEA's Convention on the Physical Protection of Nuclear Material. (May 2003) Ref.1411

Nuclear safety during conflicts
During the war in Iraq, uranium and radioactive isotopes lay unguarded for several days of looting in a warehouse near the nuclear center at Tuwaitha. With new uses of radioactive materials for “dirty bombs” and the increased drive by various states to acquire nuclear capability, increased attention is being paid to guarding nuclear materials and facilities during conflicts and social instability. (April 2003) Ref.1412

Nuclear Safety—groundbreaking resolutions adopted by the IAEA General Conference ranging from establishing nuclear-weapon-free-zones to nuclear material storage and transportation
In its effort to strengthen nuclear and radiation safety, the IAEA 47th General Conference held in Vienna, 15-19 September, adopted several resolutions: establishing a nuclear-weapon-free-zone (NWFZ) in the Middle East "as an important confidence-building measure"; resolution calling on all Member States to implement safeguards agreements and stressing the importance of additional protocols that would strengthen the system's capability for detecting undeclared nuclear material and activities; a comprehensive resolution that stresses key IAEA role for global cooperation and covers all aspects related to nuclear and radioactive material from manufacture, storage, transport to waste management. Emphasizing transportation safety, it requests the development of an Action Plan for the safe transportation of radioactive material based on the findings of the International Conference on the Safety of Transport of Radioactive Material held at the IAEA in July 2003. (August-September 2003) Ref.1413

Tightened nuclear security needed to overcome ‘dirty bombs’
At the March 2003 International Conference on Security of Radioactive Sources, IAEA Director-General Mohamed El Baradei raised the problem of “orphaned” radioactive devices that have been distributed worldwide over the past 50 years and have fallen outside official regulatory control. He warned that current controls on radioactive sources are inadequate, especially in the
former Soviet republics and called for additional security measures. "Our database of cases of smuggling...gives an indication that there is a market and there is an effort to obtain radioactive sources, and the obvious question is why," El Baradei said.

The four-day conference was organized by the IAEA and co-sponsored by the Russian Federation and the United States in co-operation with the European Commission (EC), the European Police Office (EUROPOL), the International Criminal Police Organization (Interpol) and the World Customs Organization (WCO). The issues discussed ranged from the prevention of illicit trafficking to the response to a “dirty bomb” attack. (March 2003) Ref.1414

**Commercial radioactive components recognized as “dirty bomb” hazard**

The Monterey Institute Center for Nonproliferation Studies has released an assessment of the security risks posed by commercial radioactive sources (e.g. a cesium-137 cancer therapy device), which might be used by terrorists to manufacture a "dirty bomb." Up to now, the security of such everyday components, used in science, healthcare, and industry, has not been of substantial concern to planners, but the recent association of terrorists with radiological dispersal devices has brought about a change in their view of this threat. It is now recognized that improved control of such “ingredients” is imperative. (January 2003) Ref.1415

Dirty bombs are not weapons of mass destruction (i.e. extensive immediate fatalities), but rather of mass disruption, in the form of public panic and of later prolonged and expensive cleanup. It is nevertheless important to remove this weapon from the terrorist arsenal. Control of even high security risk components is very spotty, and generally limited to advanced countries – at present the US and Canada permit the export of most high-risk sources without any government check of end users. (January 2003) Ref.1416

**FDA Approves Dirty Bomb Antidotes**

The Food and Drug Administration (FDA) approved the commercialization of two products designed to help deal with consequences of terrorists using dirty bombs. The drugs (pentetate calcium trisodium injection, Ca-DTPA; and pentetate zinc trisodium injection, Zn-DTPA) help speed elimination of radiation from the body and are especially effective for treating contamination from plutonium, americium and curium. (August 2004) Ref.1417

**Increased Funds for Study of Long-term Effects of Atomic Radiation**

The UN Special Political and Decolonization Committee approved a draft resolution encouraging UNEP to increase funding for the UN Scientific Committee on the Effects of Atomic Radiation. General Assembly Resolution 56/50 called on the Committee to continue its 47 years of work on the problems in the field of ionizing radiation. The draft resolution also requests dissemination of the Scientific Committee's finding to the General Assembly, the scientific community and the public, and welcomes member states' readiness to provide the committee with relevant information on the effects of ionizing radiation in affected areas. Increased funding will ensure the Scientific Committee’s ability to successfully discharge its responsibilities and mandate. (October 2002) Ref.1418

**New European Union Law Controls Radioactive Sources**

The new European law to control radioactive sources adopted on December 22 sets out
requirements that ensure control over every present and past high activity radioactive source in Europe. The new law addresses the issue at all levels: from prevention and recovery of orphan sources to remediation including responsibility, intervention and financing. The law requires that each source be duly identified and marked, as well as detailed record keeping of all sources for perfect traceability. (December 2003) Ref.1419

Proposed EU legal nuclear safety standards was blocked by five countries asking that the two draft laws be downgraded into non-binding instruments

The European Commission proposal to create the European Union's first ever legal nuclear safety standards is blocked by Germany, UK Sweden, Finland and Belgium who ask that two draft laws be downgraded into non-binding instruments. (October 2003) Ref.1420

UN Conference on Disarmament 2003 Session

The UN Conference on Disarmament in Geneva has been unable to reach consensus on a program of work since 1998. The impasse may be resolved by the “Five Ambassadors Initiative” [see the Millennium Project’s September 2002 emerging environmental security issue report] that proposes four separate tracks with a separate work plan for each track: 1) guarantees not to use nuclear weapons against non-nuclear states; 2) nuclear disarmament; 3) a ban on production of weapons-grade fissile materials; and 4) prevention of an arms race in space. Delegates to the Disarmament Conference have welcomed this initiative, but it is not yet clear if it will be adopted. February 5-7, 2003, the Secretary-General’s Advisory Board on Disarmament Matters will meet in closed session in New York, and may make recommendations useful to the Conference on Disarmament. This first part of the Conference ends on March 28. The next two parts will be held from May 12 to June 27, and from July 28 to September 10. (January 2003) Ref.1421

Russia signs treaty to track nuclear waste

Russia, US, and EU signed The Multilateral Nuclear Environmental Program in the Russian Federation (MNEPR) treaty to clean up Russian atomic waste and stop it from getting into the hands of terrorist groups. It provides a legal framework for handling atomic waste enabling authorities “to control the proliferation of weapons of mass destruction" French Foreign Minister Dominique de Villepin said. (May 2003) Ref.1422

Russian Submarines Dismantlement an International Concern

Russia intends to raise the issue of foreign aid to assist in the dismantlement and destruction of its obsolete submarine fleet at the upcoming G8 summit. Current proposals to extend existing programs for securing nuclear materials (and destroying biological and chemical agents) to other countries worry Russia because of potential dilution of funds appropriated for this purpose. (May 2004) Ref.1423

Russia’s Floating Nuclear Plants Pose International Security Risk

Russia has started building the world’s first floating nuclear power plant. A ship with two 35-megawatt reactors is expected to be operational in three years and supply electricity in remote areas in Russia as well as potential foreign markets. Despite warnings from environmentalists, Russia plans to build seven of these nuclear ships. [See also Increasing Nuclear Safety and Security] (April 2007) Ref.1424
Revival of Nuclear Power in Asia Poses Security Concerns

China is planning to build two large new nuclear reactors per year for the next 16 years. While much of the rest of the world is turning away from this energy source, 16 of the 27 nuclear power plants now being built worldwide are in China, India, Japan and South Korea. The political-military issues of this are addressed in the new edition of The Military Balance by the London-based International Institute of Strategic Studies. (October 2004) Ref.1425

China to Control NBC and Missile Exports, Possibly Join MTCR

Speaking at the 5th Sino-US Conference on Arms Control, Disarmament and Nonproliferation, Vice Foreign Minister Zhang Yesui announced a set of laws and regulations to control exports of nuclear, biological, chemical, and missile technologies. These presumably represent the full embodiment and extension of the similar biological weapons and missile provisions announced in August and October 2002. Zhang also indicated China's willingness to join the Missile Technology Control Regime (MTCR). (July 2004) Ref.1426

International Cooperation to Address Radioactive Waste Emergent Disaster in Central Asia

"Radioactive waste in northern Tajikistan is the biggest human-made disaster in Central Asia," said an Environmental Officer of the OSCE at a two-day conference on radioactive waste disposal sites in northern Tajikistan and its consequences on the environment and health of the local population. During the Soviet era, nuclear waste in Tajikistan was not managed well. As a result, it is now claimed that 10 million people in the basin of the Syr-Darya River have been affected by nuclear waste. Over 200 participants from countries of the Commonwealth of Independent States, as well as representatives of the UN, the EU, the U.S., and Iran came to Dushanbe to share their expertise in addressing this problem, which has also been a cause of tension with neighboring states, namely Uzbekistan, Kyrgyzstan and Kazakhstan. The conference recommendations will be submitted to the International Atomic Energy Agency (IAEA) and the OSCE Permanent Council for a further action plan. (November 2004) Ref.1427

UN Investigators Warn of Illegal Uranium Mining in DRC

UN investigators warned that illegal mining at a closed uranium mine in the Democratic Republic of the Congo poses a terrorism risk. UN authorities “recommended that this mine be secured and put in the charge of a private operation for much more disciplined operations, with the aim of avoiding risks including the high rate of radioactivity ... and uranium trafficking with those who shouldn't get it in their hands.” The potential threats of transnational organized crime in cooperation with terrorists for illegal uranium mining are significant. (July 2004) Ref.1428

Israeli Dimona Nuclear Reactor

Ben Gurion University, the Water Authority, and the Center for Atomic Researches in Wadi Sureek have published findings of elevated radiation levels in the Negev and Arava aquifers near the Dimona reactor. This follows warnings from the Palestinian Environment Quality Authority last year of the potential environmental threat of the aging Dimona reactor. (July 2004) Ref.1429

Small Disposable Nuclear Power Plants Raise Environmental Concerns

The U.S. Department of Energy's Lawrence Livermore National Lab is developing a "small sealed transportable autonomous reactor" (SSTAR) that can meet the energy needs of developing...
countries without the risk of diverting fissile material to weapons programs. The reactor will have partial breeder capability, and will incorporate a mechanical system to move a generation point along a linear fuel store. A satellite-based alarm system to guard against tampering is planned. The reactors can be transported to a location, and without needing refueling or maintenance, generate power in the 10-100 MW range for up to 30 years. A prototype is hoped for by 2015. (September 2004) Ref.1430

**POTENTIAL HEALTH THREATS OF SOME NEW TECHNOLOGIES**

**Nanotechnology**
Nanocomponents are so small as to effectively act as particles, which could be inhaled or ingested after destruction of their containing products, leading to mechanical damage or chemical toxicity in the body. A few years ago, the Millennium Project conducted a study to identify potential environmental and health implications of the use of nanotechnology by the military. The main findings are presented in the section *Nanotechnology: Future Military Environmental Health Considerations* available on this CD in the “Science and Technology” Chapter.

The following are a few websites providing continuous updates on nanotechnology assessments, and therefore could be useful to those concerned with addressing potential health and environmental implications of nanotechnology:

- [http://epa.gov/oppt/nano/](http://epa.gov/oppt/nano/)
- [http://www.nanotechproject.org/inventories](http://www.nanotechproject.org/inventories)

**Assessment of Potential Health and Environmental Implications of Nanotechnology**

**Some Conferences on Nanotechnology with Environmental Security Implications**

**Assessment of Potential Health and Environmental Implications of Nanotechnology**

**Code of Conduct for Responsible Nanotechnologies**

The European Commission (EC) invites comments on the proposed Recommendation on a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research. The Commission intends to collect views on the safe development of NST from a broad audience, ranging from research, industry, civil society, policy and media, and the general public.

The UK’s Royal Society and a group of other organizations have begun an initiative to develop a "Responsible NanoCode" for businesses working with nanotechnologies. According to Nanowerk, "The aim of the Code will be to establish a set of internationally relevant principles which outline good practice for businesses involved in all aspects of these emerging technologies and their applications including research, development, manufacturing, distribution and retailing." The code will be developed by a working group of representatives from a variety of stakeholders.

A U.S. Congressional bill ‘To ensure the development and responsible stewardship of nanotechnology’ was referred on July 31, 2007 to the Committee on Science and Technology,
and in addition to the Committees on Ways and Means, Energy and Commerce, and Homeland
Security. A "Pollution Prevention through Nanotechnology" conference will be held September
25-26, 2007, in Arlington, VA. The forum is organized by EPA to improve understanding of
nanotechnology and to "encourage responsible development of nanotechnology that prevents
pollution." (July 2007) Ref.1433

Corporations under Stockholder Pressure for Nanotech Disclosure
According to a story in Meridian Nanotechnology and Development News, a number of
companies are coming under pressure from stockholder resolutions to make public the presence
of nanomaterials in their products, and their policies for dealing with these possibly hazardous
substances. (January 2009) Ref. 1434

Nanotechnology Health Concerns Highlight Need for International Technology Convention
Buckyballs are spheres formed by a specific number and arrangement of carbon atoms. They are
very important for a range of nanotechnology applications, but according to research presented at
a recent meeting of the American Chemical Society, Buckyballs can cause extensive brain
damage in fish. Other studies have shown that such particles can enter the brain. The fish studies,
however, were the first to link nanoparticles to the destruction of brain tissue. Additional studies
are underway to determine if coating such nanoparticles affects toxicity.
In reaction to this and other nanotechnology-related health issues, the ETC Group suggests, “The
international community must formulate a legally-binding mechanism to govern the products of
new technologies, based on the Precautionary Principle, one that addresses their health, socio-
economic and environmental implications. International assessment should be incorporated
under a new International Convention for the Evaluation of New Technologies (ICENT).” (April
2004) Ref.1435

National Research Council Calls for Better Nanotech Risk Assessment
Nanotechnology-Related Environmental, Health, and Safety Research, that, “finds serious
weaknesses in the government's plan for research on the potential health and environmental risks
posed by nanomaterials”, and emphasizes that, “An effective national plan for identifying and
managing potential risks is essential to the successful development and public acceptance of
nanotechnology-enabled products”. (December 2008) Ref. 1436

UN Report Assesses Nanotech and Climate Change
The Institute of Advanced Studies of the United Nations University issued a new report,
Innovation in Responding to Climate Change: Nanotechnology, Ocean Energy and Forestry, that,
“offers three innovative solutions in responding to climate change, namely nanotechnology,
ocean energy and forestry”, critically assesses, “the opportunities and challenges that each type
of innovation presents”, and, “addresses the question why these innovations—despite their large
potential to reduce emissions, ocean energy alone could cover the world’s electricity needs—
have not yet reached the stage of mass commercialization.” (December 2008) Ref. 1437

The EU FP7 (EU’s Seventh Research Framework Programme) project “ObservatoryNANO”
has begun operation. According to nanoforum.org, it is funded for four years and “will collate
and analyze data regarding scientific and technological (ST) trends and economic realities and
expectations. The ST and economic analysis will be further supported by assessment of ethical and societal issues, impacts on health, environment and safety, as well as regulation, standardization, and legislative issues.” (April 2008) Ref. 1438

The EU FP7 “ObservatoryNANO” project has expanded its operation. Its Web site, http://www.observatory-nano.eu - is now on-line, and contains (click on “Catalogue”), most of 56 recently written interim reports on scientific and technological developments in all sectors of nanotechnology, including energy, environment, and health. (November 2008) Ref. 1439

Report on Ethical Evaluations of Nanotechnology
The Wilson International Center’s/Pew Trust’s Project on Emerging Nanotechnologies has issued a new report on Ethical Evaluations of Nanotechnology that strives to, “…address social and ethical issues … [and] both the substantial potential risks of nanotechnology and its possible significant contributions to our well-being and environmental sustainability,” and, “emphasizes ways in which such topics intersect with governmental functions and responsibilities, including science and technology policy, as well as research funding, regulation and work on public engagement”, according to a Project announcement. (January 2009) Ref. 1440

EU to Fund Nanoparticle Environmental Risk Study
The EU is launching a new project, ENNSATOX, led by Dr Andrew Nelson, a chemist at the University of Leeds, to investigate the environmental impact of nanoparticles found in everyday products, such as suntan cream, including the relationship between the physical structure of nanoparticles and their toxicity. The project has been awarded €3 million, and will involve scientists from five countries.
This new project is especially significant since research has not yet settled the question of whether metallic compound nanoparticles in preparations, like sunscreens, applied to the skin constitute a health risk. According to a published report, an inquiry by the New South Wales Parliament in Australia has, “concluded that nano versions of existing chemicals should be assessed as new chemicals and recommended that ‘ingredient labelling requirements for sunscreens and cosmetics include the identification of nano-scale materials’ ”. The same report states, “The [Therapeutic Goods Administration] estimates about 70 per cent of sunscreens with titanium dioxide and 30 per cent with zinc oxide have these materials in a nanoparticle form.” The ENNSATOX project will pay particular attention to this family of compounds. (December 2008) Ref. 1441

European Nanotech Safety Proceedings Published
The proceedings of the European Commission Dialogue Workshop on Nanotechnology: Safety for Success, held in Brussels in October, have been published online, covering a number of topics in nanotech regulation and risk assessment. (December 2008) Ref. 1442

The Woodrow Wilson International Center Opens Synthetic Biology Project
Genomic pioneer Craig Venter has said that we will write genetic code to create artificial biology, as we wrote computer code to create software. Synthetic biology holds great promise but also may create unintended consequences and a new weapons source for bioterrorists of the future. The Woodrow Wilson International Center for Scholars launched the Synthetic Biology Project in January within the Center’s Foresight and Governance Project to “foster informed
public and policy discourse concerning synthetic biology” by providing “independent, rigorous analysis that can inform critical decisions affecting the research, commercialization and use of synthetic biology.” Some experts estimate that by 2015 a fifth of the chemical industry could be dependent on synthetic biology. A Wilson Center panel exploring unresolved synthetic biology ethical questions remarked that, although threats related to synthetic biology are not different from those related to most sciences, regulations are lagging, opening the possibility for misuse. Hence, they suggested that the problem to be addressed is to get policy and commercial organizations to adopt ethical criteria, standards, and policies. (January 2009) Ref. 1443

Russia Introduces Nanotechnology Certification System
Russia has launched NANOCERTIFICA, the Russian Federation’s first certification system for industrial nanotechnology production. According to Nanowerk News, the opening press conference addressed “development of testing and the methodological base of the certification system” and “the financing and qualification level of conformity evaluation centers and the possibility of using nanomaterials in medicine, cosmetology, ecology and water purification”. (October 2008) Ref. 1444

Tunisian Nanotech Association Formed
The creation of the Tunisian Association of Nanotechnology has been announced. The Minister of the Environment and Sustainable Development noted, "...the seminal importance of the use of nanotechnologies on the prevention of pollution, water desalination, and the environment", and cautioned that the use of nanotechnology should go, "hand in hand with risk assessment measures to ensure a sound use of these new technologies." According to allAfrica.com, he also announced that the Tunis Environmental Centre of Environmental Technologies (CITET) would open its laboratories to members of the association. (December 2008) Ref. 1445

Environmental Effects from Nanomaterial Production May Outweigh Its Benefits
An item in physorg.com states that “Environmental gains derived from the use of nanomaterials may be offset in part by the process used to manufacture them, according to research published in a special issue of the Journal of Industrial Ecology.” A paper by Hatice Şengül and colleagues at the University of Illinois at Chicago, asserts that “strict material purity requirements, lower tolerances for defects and lower yields of manufacturing processes may lead to greater environmental burdens than those associated with conventional manufacturing.” A team led by Vikas Khanna at Ohio State University “found, for example, that the lifecycle environmental impacts [of carbon nanofiber production] may be as much as 100 times greater per unit of weight than those of traditional materials, potentially offsetting some of the environmental benefits of small size of nanomaterials” like less waste and cleaner processes. (October 2008) Ref.1446

New Study on the Carcinogenicity of Nanoparticles and Other Dusts
According to Nanowerk.com, the German Federal Institute for Occupational Safety and Health has released a study whose aims were to analyze differences between the carcinogenicity of granular dusts in the rat lung after intratracheal instillation, to find out the optimal dose metric for their carcinogenic potency, and to interpret their potential relevance for human health. Four of the 16 dusts tested could be classified as nanoparticles. The conclusion was that, overall, the state of knowledge meets the EU criteria for a classification of most of the particles into category 2 of carcinogenic substances. (July-August 2008) Ref. 1447
The UK Royal Commission on Environmental Pollution issued this latest report, which “examines issues related to innovation in the materials sector and the challenges and benefits arising from the introduction of novel materials (specifically nanomaterials) … [and] makes recommendations on how to deal with ignorance and uncertainty in this area”. This document is accompanied by four supplemental reports and is partly based on input solicited from more than 100 organizations with relevant experience. (November 2008) Ref. 1448

New Study Shows Nanoparticles In Sewage Could Escape Into Bodies Of Water
Researchers at ETH Zurich, the University of Applied Sciences Wädenswil, and BMG Engineering AG, led by Prof. Wendelin Stark, have shown that a portion of nanoparticles of cerium dioxide in industrial sewage, previously thought to be removed by biological purification or trapped in sewage sludge, can remain in the effluent and can leave the sewage works practically unchanged. According to the news story, what happens to the particles after a sewage plant has scarcely been researched up to now. (July-August 2008) Ref.1449

Diesel Exhausts Emit Nanoparticles Affecting Lung Function
According to a news release, Prof. Angela Violi, of the Univ. of Michigan College of Engineering, is presenting a simulation paper to the American Chemical Society that predicts that nanoparticles from diesel engine exhausts “can get trapped in the lungs and inhibit the function of a fluid [a surfactant] that facilitates breathing”. Also the EPA has awarded a grant to a team of researchers led by Prof. Robert Yokel, of the College of Pharmacy at the Univ. of Kentucky, to define the basic properties of nanoparticles of cerium oxide, a diesel fuel additive used in Europe. According to an announcement, the research will define the basic properties of the particles and examine how they are absorbed by the body. (July-August 2008) Ref. 1450

New Batteries Raise Health/Safety Worries about Lithium Nanoparticles
A recent column by Philip Stiff, a member of the Project on Emerging Nanotechnologies at the Wilson Center, raises questions about the “foreseen and unexplored environmental, health and safety risks associated with the manufacture, use, recycling, and disposal of nanoscale lithium-ion batteries”, emphasizing the lack of studies on the end-of-life processes for these units. (October 2008) Ref.1451

Current Developments/Activities on the Safety of Manufactured Nanomaterials/Nanotechnologies report by the Organization for Economic Co-operation and Development (OECD) summarizes the 2nd Meeting of the Working Party on Manufactured Nanomaterials held in Berlin, Germany, April 25-27 2007. It catalogs the initiatives in industrialized countries to address the health and environmental safety implications of manufactured nanomaterials organized by progress since the first meeting and work underway or planned in the country or organization. The recommended headings were:
1. Any national regulatory developments on human health and environmental safety including recommendations or discussions related to adapting existing regulatory systems or the drafting of laws/ regulations/ guidance materials;
2. Developments related to voluntary or stewardship schemes;
3. Information on any risk assessment decisions;
4. Information on any developments related to good practice documents;
5. Research programmes or strategies designed to address human health and/or environmental safety aspects of nanomaterials;

EPA Conference on Nanoscale Materials. On 13 August EPA announced that it will be holding a Peer Consultation on Materials Characterization of Nanoscale Materials: September 6-7, 2007, in Rosslyn VA. The meeting's goal is to help develop EPA's Nanoscale Materials Stewardship Program (NMSP) under the Toxic Substances Control Act (TSCA). EPA is requesting comment on characteristics currently used or potentially available to characterize nanoscale materials, rationale for the use of these characteristics, and issues to consider regarding use of these characteristics in the NMSP.

Study Shows Nanotube Manufacture May Pollute Environment. A study by Desirée L. Plata and colleagues at MIT, reported at the 234th national meeting of the American Chemical Society, has shown that chemical vapor deposition, one of the main methods for making carbon nanotubes, can release into the environment various toxic polycyclic aromatic hydrocarbons, and other hydrocarbons that are harmful to the atmosphere and human health.

Canada published a new Substances Program Advisory Note 2007-06, Requirements for nanomaterials under the New Substances Notification Regulations (Chemicals and Polymers)


REFNANO: Reference materials for engineered nanoparticle toxicology and metrology addresses the potential role of reference materials in toxicology and metrology created by a team of UK scientists, commissioned by the UK Department for Environment, Food and Rural Affairs (Defra). It provides a prioritized list of reference materials relevant to nanotechnology, focusing on materials produced and used in the UK.

The Director of the Woodrow Wilson Center’s Project on Emerging Nanotechnologies has indicated disappointment with a recent report, Prioritization of Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials, prepared by a working group of the Nanoscale Science, Engineering, and Technology Subcommittee (NSET), part of the federal government’s National Science and Technology Council. The Director states, "Notably absent are important details like budget allocations, implementation time frames, and assigned responsibilities." (September 2007) Ref.1453

Survey of Nanotube Toxicity to Immune Systems
Exploring the Immunotoxicity of Carbon Nanotubes (http://www.springerlink.com/content/g4u1716412126840/) paper reviews some existing studies assessing carbon nanotubes’ toxicity to immune systems and provides the potential mechanistic explanation. (September 2008)1454

UK Government Nanotechnology Policy Workshop for Industry held on October 19, 2007, organized by the Department for Environment, Food and Rural Affairs (Defra) and the European Nanotechnology Trade Alliance (ENTA) to provide updates from the UK government regarding: research progress from the nanotechnology research coordination group; Defra’s voluntary reporting scheme; Council for Science and Technology report on government progress against
nanotechnology commitments; overview of the international efforts; and industry perspectives. BSI British Standards is publishing nine documents addressing nanotechnology health and safety issues for UK industry; seven deal with terminology—from fabrication to labeling—and two provide guidance for safe handling and disposal of free engineered nanoparticles, and for specifying nanomaterials. Indian scientists warn that India faces serious nanotech environmental health and safety issues due to absence of guidelines on nanoparticle toxicity and biosafety regulations in India and worldwide. Scientists from the Energy Resources Institute in Delhi launched a study this year to investigate the opportunities and risks associated with the technology. (October 2007) Ref.1455

Scientists at Cambridge Univ. and the Daresbury Laboratory have developed a new method of studying the effects of carbon nanotubes on living cells. Alexandra Porter, a lead scientist at Cambridge, has explained that, by using transmission electron microscopy (TEM) and confocal microscopy, the entry and migration of nanotubes into and within cells can be visualized. First results, published in the October 28 online edition of Nature Nanotechnology, showed that cell death caused by certain nanotubes depended on the dose and exposure time and suggest that the toxicity is linked to the movement of the tubes into the cytoplasm and nucleus of a cell. This might help to elucidate the relationship between the physics and chemistry of nanomaterials and their biological effects, and hence help nanotech EHS research.

_Nanotechnology large risks with tiny particles_ report by KemI, Sweden’s chemical regulators, proposes that the Government: allocate special research funds to the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) for research on health and environmental risks of nanomaterials; instruct the Swedish Chemicals Agency to: follow developments in the area and propose measures whenever justified, and to participate actively in the development of new or modified testing methods within the OECD cooperative framework; instruct the Swedish Chemicals Agency to produce a deeper analysis of the use of nanomaterials in chemical products and articles after consultation with the trade organizations concerned; instruct the governmental agencies concerned to review the need for complementing existing legislation; arrange, in the context of Sweden’s EU presidency in 2009, a workshop on how the health and environmental risks of nanotechnology should be dealt with by legislation.

The U.S. Agency for Toxic Substances and Disease Registry (ATSDR) (part of the Department of Health and Human Services) has requested nominations from a list of proposed substances that it will evaluate for toxicological profile development. The list of proposed substances includes nanomaterials. The list of selected substances will be published late winter or early spring in the Federal Register. The added profiles will be publicly available in October 2008. Interested parties can monitor the profile list for the latest information at [http://www.atsdr.cdc.gov/toxpro2.html](http://www.atsdr.cdc.gov/toxpro2.html).

A U.S. national survey on the potential impacts of nanotechnology reveals that while more optimistic about the possible benefits of nanotechnology, nanoscientists are significantly more concerned than the general public for some issues related to the environmental and health impacts of nanotechnology. They say that more research is needed to assess nanotech long-term implications. Only 15% to 20% of the public expressed concern related to nanotech risks, versus 20%-30% by nanoscientists. The study was published in _Nature Nanotechnology_ (November 25.)

_The challenge of regulating nanomaterials_ is a well-documented article published in the Environmental Science and Technology journal, offering an excellent overview of the
nanotechnology-related risks and regulations picture.

EuroNanOSH, the first European Conference focusing on occupational safety and health from the viewpoint of nanotechnology and engineered nanoparticles in workplaces, will be held in Helsinki 3-5 December 2007. According to the announcement, “The Conference will evaluate the current safety situation of engineered nanoparticles in Europe and consider what actions are required in the near future. … one of the main objectives of the Conference is to present the current understanding regarding the safety of engineered nanoparticles and to draw conclusions to protect workers both within and outside of Europe.”

The Nanotechnology for Security and Crime Prevention III conference, organized by the Institute of Nanotechnology, will be held January 17, 2008, at The Royal Society, London. The conference will provide an update on the latest advances in nanotechnology with applications for security and fight against crime. Several papers on chemical detection will be presented.
(November 2007) Ref.1456

The first nanotechnology genotoxicity (toxicity at the molecular level) tests found that carbon nanotubes could damage DNA. Researchers at the University of Dayton have assessed the DNA damage response to multi-walled carbon nanotubes (MWCNT) in mouse embryonic stem cells. The methodology used is highly versatile for testing genotoxicity and hence can be expanded for genotoxicity tests of other nanomaterials.

The “Nanotechnology & the Media: The Inside Story” meeting held at the Woodrow Wilson Center discussed the results of a study analyzing media coverage of nanotechnology risks in the U.S. and UK. The study reveals a large increase in the number of articles, with the focus being mainly on health, environmental and security aspects. Coverage is higher for regulatory and reports related issues than for scientific matters. Concerns about nanotech risk are increasing at non-profits and governments, and governments are responding most strongly to risk concerns. In general, there was a strong feeling that there is not enough media coverage on the nanotech risk issues. (December 2007) Ref.1457

The First Annual Conference on Nanotechnology Law, Regulation and Policy will be held February 28-29 in Washington, DC. The conference will include discussions of whether the FDA will implement its Nanotechnology Task Force Report, how OSHA will address nanotechnology-related issues in the workplace, and how the European and Asian approaches to nanotechnology regulation differ from that of the U.S. The conference is co-sponsored by the Food and Drug Law Institute, and the Woodrow Wilson International Center for Scholars Project on Emerging Nanotechnologies, in partnership with Arizona State University and the Burdock Group.

The UK Institute of Occupational Medicine’s SAFENANO Information Service and Community Portal has set up SAFENANO Scientific Services to provide multidisciplinary risk management solutions to companies operating in the nanotechnology industry. The services, planned to assist with safety issues ranging from employees’ working conditions to end products, include training, laboratory tasks, and toxicology information update. (January 2008) Ref.1458

The European Commission has adopted a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research, and is recommending to the Member States the adoption of the Code to govern research in this field. The Code is based on seven principles such as sustainability (non-threatening to the present or future environment) and accountability, and provides guidelines for their implementation.
European Commission grants $587,000 to London School of Economics researchers to conduct an international research project on regulating nanotechnologies in the European Union and the United States.

*Technology Roadmap for Productive Nanosystems* by Foresight Nanotech Institute and Battelle, according to the announcement, “…is a first attempt to map out the R&D pathways across multiple disciplines to achieve atomically precise manufacturing.” It provides a detailed technical background for consideration of the environmental problems that might arise during these processes.

*Strategy for Nanotechnology-Related Environmental, Health, and Safety Research* published February 2008 by the National Science and Technology Council describes the National Nanotechnology Initiative’s (NNI) strategy for addressing priority research on the environmental, health, and safety (EHS) aspects of nanomaterials. The report assigns priorities to research and information needs that were identified in the NSET Subcommittee document *Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials*, published on September 21, 2006.

*Risks of nanotechnology remain uncertain* published in the American Chemical Society’s Environmental Science & Technology Online is a comprehensive overview of the current state of nanotechnology risk assessment, emphasizing the paucity of solid scientific results in that important field and giving useful examples and references. (February 2008) Ref.1459

Federal Toxics Disclosure Law Could Provide Data on Nanotechnology Risks. According to a news release, the Project on Emerging Nanotechnologies (PEN) of the Woodrow Wilson Center and the Pew Charitable Trusts has released a legal analysis that finds that EPA’s Toxic Release Inventory (TRI) could be applied to the production and commercialization of nanotechnology, although the applicable statute may need to be amended to take care of the special aspects of nanotechnology risk assessment. The report also emphasizes that additional disclosure-related measures for nanotechnology risks should be considered and that “additional research is required to determine whether application of TRI to nanomaterials should be pursued as a policy priority in the near term”.

Nanotechnologies at the OECD. According to nanoForum.org, “The OECD has prepared an overview of its work on nanotechnologies for Forum VI of the Intergovernmental Forum on Chemical Safety (IFCS). The paper, titled Nanotechnologies at the OECD, describes the two activities of OECD related to nanotechnologies: i) the activities of the Working Party on Manufactured Nanomaterials (WPMN); and ii) the Working Party on Nanotechnology (WPN).” The stated objective of WPMN is “to promote international co-operation in human health and environmental safety related aspects of manufactured nanomaterials (MN), in order to assist in the development of rigorous safety evaluation of nanomaterials.”

Explosivity and Flammability of Nanopowders. An item from nanoForum.org announces a new report on this subject from the NANOSAFE2 project, “One of the main questions asked about nanopowders, when it comes to explosivity and flammability, is: do nanopowders behave like other powders and, as such, can they more readily ignite and explode? During this study, carried out in the frame of the European Nanosafe2 project, safety parameters of nanopowders and their associated techniques and practices have been characterised for a representative set of particles of industrial relevance.” It concludes that behavior depends on the materials and surfaces on which nanopowders are applied and hence, “Specific prevention and protection measures should then be taken.”
Report Warns of Nano Hazards in Foods. A new report from Friends of the Earth notes that “Untested nanotechnology is being used in more than 100 food products, food packaging and contact materials currently on the shelf, without warning or new FDA testing.” and “calls on the FDA to stop the sale of all nano food, packaging, and agricultural chemicals until strong scientific regulations are enacted to ensure consumer safety and until ingredients are labeled.” (March 2008) Ref.1460

New Analysis of Nanotech Risk Assessment Funding by the Project on Emerging Nanotechnologies, analyzing nanotech spending for fiscal year 2006, found that only $13 million—representing less than 1% percent of the $1.4 billion U.S. National Nanotechnology Initiative budget—was spent on federal research projects highly relevant to addressing possible environment, health and safety risks related to nanotechnology. The same year, European countries invested nearly double—$24 million —on similar nanotech risk-assessment projects. Draft legislation proposed by the U.S. House of Representatives Science Committee would require that in the future, a minimum 10% of the NNI budget be devoted to risk assessment research.

The NSTI Nanotech 2008 Conference is scheduled to be held in Boston 1-5 June. Two sessions on “Environmental [sic], Health and Toxicology”, including a paper on “Legislative, Regulatory [sic] and Risk Management for Nanotech EHS”, are on the program for 5 June. (April 2008) Ref. 1461

According to a story in PhysOrg.com, “A major study … in Nature Nanotechnology suggests some forms of carbon nanotubes … could be as harmful as asbestos if inhaled in sufficient quantities.” Reporting experiments carried out on mouse tissue, one of the researchers, Prof. Kenneth Donaldson of the University of Edinburgh, stated, “Long, thin carbon nanotubes showed the same effects as long, thin asbestos fibers”, causing pathological responses known to be precursors of mesothelioma. The scientists noted that it is still unknown if the tubes can be inhaled and reach sensitive portions of the lungs. (May 2008) Ref.1462

A petition filed by a citizens’ coalition with the U.S. Environmental Protection Agency is demanding the agency exercise its pesticides’ regulating authority and stop the sale of about 260 products containing nano-silver, due to the compound’s possible risks to human health and the environment. The coalition of consumers, health, and environmental groups is led by the nanotech watchdog International Center for Technology Assessment. (May 2008) Ref.1463

The European Commission is planning to launch a large-scale public consultation for raising awareness about nanotechnologies’ potentials and at the same time for addressing citizens’ concerns about nanotech’s possible health and environmental impacts. (June 2008) Ref.1464

Stanley Shaw, a chemical biologist at Massachusetts General Hospital Center for Systems Biology, and his colleagues at the Broad Institute of Harvard and MIT have designed a high-throughput screening method for assessing the biological effects of nanomaterials. The technique uses robotic equipment to place individual nanoparticle types and cell types in various combinations into hundreds of tiny wells in a plate, where an automatic screening system determines the resulting biological effects. Software then analyzes the data, seeking relationships among the different combinations. (June 2008) Ref.1465
The Project on Emerging Nanotechnologies of the Woodrow Wilson Center, in cooperation with the Grocery Manufacturers Association, has issued a report that examines the path of several hypothetical applications of nanotechnology-enabled food packaging through the current regulations and examines potential future challenges related to this issue. (June 2008) Ref.1466

Grand Challenges for Nanotechnology
A group led by Andrew Maynard of the Woodrow Wilson Center’s Project for Emerging Nanotechnologies suggest five "grand challenges" for nanotechnology over the next 15 years:

- develop instruments to assess exposure to engineered nanomaterials in air and water within next 3-10 years
- create and test ways of evaluating the toxicity of nanomaterials in 5-15 years
- generate models to predict their possible impact on the environment and human health over the next 10 years
- develop ways to assess the health and environmental impact of nanomaterials over their entire lifetime, within the next five years
- organize programs to enable risk-focused research into nanomaterials, within the next 12 months

The leadership of the House of Representatives Science Committee commented, "This paper should be a landmark in the history of nanotechnology research. It lays out a clear, reasonable, prioritized, consensus-based set of priorities for examining the potential environmental and health consequences of nanotechnology over the next decade and a half." (November 2006) Ref.1467

UK to Have New Nanotechnology Risk Information Service
The UK Department of Trade and Industry has announced that a new nanotechnology risk information service, Safenano.org, is due for launch in April 2007, and "will take the form of a web-based information service … with a regular bulletin service and comprehensive database of relevant publications. Emerging scientific evidence concerning the potential risks of nanoparticles and nanotubes, together with information about Health and Safety, Occupational Hygiene, Toxicology and Risk Assessment will be interpreted and delivered to the audience in an integrated way, to support effective risk management. "(November 2006) Ref.1468

Risks of Nanotechnology Applications
A recent article in Nanowerk pointed out the increasing use of nanomaterials in building construction, and the consequent rise in health and environmental risks because of this usage. (November 2006) Ref.1469

Berkeley, California, Considering Nanoparticle Health and Safety Law
The city of Berkeley, California is proposing the world's first local regulation of nanomaterials. It would add a nanoparticles health and safety disclosure to a city law that already requires an inventory and safety plan from any business or other person handling large quantities of hazardous materials. Other localities have discussed such measures, but this is the furthest any has progressed. (November 2006) Ref.1470
Carbon Nanotubes May Spread in Water More Widely Than Thought
A study by Jaehong Kim and colleagues at Georgia Institute of Technology has shown that carbon nanotubes, which are hydrophobic and clump together in water, may nevertheless interact with natural organic matter found in lakes and rivers, in ways that lead to their wider dispersion. (December 2006) Ref. 1471

Scientists Correlate Nanoparticle Structure and Toxicity
Andre Nel and his team at UCLA's Johnson Cancer Center have been investigating the relationships between the structural characteristics of nanoparticles and their toxicity. According to Meridian Nanotechnology and Development News, this work "contributes to efforts to identify key factors or tests that can be used to predict toxicity, permit targeted screening, and allow materials scientists to generate new, safer nanoparticles with this structure-toxicity information in mind…. [They] found that ambient particles and positively charged polystyrene spheres generated high levels of reactive molecules, and induced oxidative stress in defense cells from the lung called macrophages. Little activity was observed for carbon black, titanium dioxide, and negatively charged polystyrene spheres." (October 2006) Ref. 1472

Australian New Report and Research Group on Nanotechnology
Options for a National Nanotechnology Strategy, a report by an Australian federal government taskforce, outlines the establishment of a national nanotechnology office and a public awareness campaign on the potential social and ethical implications of nanotechnology. The report notes the insufficient information about the potential health risks of nanoparticles and calls for more research on toxicity and occupational and environmental risks. NanoSafe Australia is a new group of nanotechnology toxicologists formed for investigating risks associated to nanoparticles use and handling. (October 2006) Ref. 1473

Nanomaterials Handbook
A new 780-page Nanomaterials Handbook has been published by CRC Press. With 27 chapters by 62 authors, this encyclopedic work thoroughly covers the field, and received a very favorable review in Nature. The only significant criticism was its lack of almost all 2005 and later work (a type of problem difficult to avoid in a very large compendium in a rapidly advancing field). (October 2006) Ref. 1474

Characterising the potential risks posed by engineered nanoparticles
Characterising the potential risks posed by engineered nanoparticles—UK Government research—a progress report by the UK Department for Environment, Food and Rural Affairs (DEFRA), covers the work of five Task Forces: Metrology, Characterisation, Standardisation and Reference Materials; Exposures – Sources, Pathways, and Technologies; Human Health Hazard and Risk Assessment; Environmental Hazard and Risk Assessment; and Social and Economic Dimensions of Nanotechnologies. According to the DEFRA announcement, the report includes details of the UK’s action plans and assesses progress made towards meeting the 19 research objectives presented in the 2005 report. (October 2006) Ref. 1475

Review of Safety Practices in the Nanotechnology Industry
Workplace was prepared for the International Council on Nanotechnology by the University of California, Santa Barbara. According to the press release, the report “offers a review and analysis of existing efforts to develop 'best practices' ” but “finds that efforts to catalogue workplace practices have not systematically documented current environment, health and safety practices in a variety of workplace settings and geographies.” (October 2006) Ref. 1476

**Data Base for Nano Environmental Health and Safety**
The International Council on Nanotechnology (ICON), managed by Rice University’s Center for Biological and Environmental Nanotechnology, has established the ICON Environmental, Health and Safety (EHS) database, containing summaries (abstracts) and citations for research papers related to the EHS implications of nanoscale materials. The database allows search by keywords and by aspects of the research reported, such as "exposure pathway = inhalation". (September 2006) Ref. 1477

**Major German Study on Nanotech in Food Industry**
The German Federal Institute for Risk Assessment (Bundesinstitut für Risikobewertung (BfR)) is undertaking a major assessment of the potential dangers of nanotechnology in the food industry. The study will involve 100 experts from research, industry, public agencies, consumer associations, and NGOs in a multi-phase interviewing and mutual commenting process. According to Food Production Daily, "the objective is to identify … nanomaterials, assign them to concrete applications, and then draw conclusions on consumer exposure. … The applications will then be classified according to the level of probable risk and risk reduction strategies developed." The project is expected to be finished by the end of the year. (September 2006) Ref.1478

**Nanotube Toxicity Tests Unreliable**
Researchers from the Institute of Toxicology and Genetics at the Karlsruhe Research Center in Germany may have discovered why carbon nanotubes toxicity tests are not consistent. Their investigation revealed that a reaction between the nanotubes and two non-soluble toxicity test reagents, formazan and methylthiazol tetrazolium (MTT), was causing a "false positive" outcome. Three other tests on the same nanomaterial had yielded negative results. (September 2006) Ref.1479

**Inhaled Nanoparticles May Have Easy Path to Brain**
Studies by scientists at the University of Rochester Medical Center found that nano-sized materials inhaled by rats had rapid and efficient pathways from the nasal cavity to several regions of the brain. They also caused changes in gene expression in the invaded regions. These are preliminary results, in an animal model, and have not shown actual cellular damage, but later proof of deleterious effects in higher models would have a strong effect on the regulation of airborne nanoparticles. [See also Nanotechnology Health Concerns Highlight Need for International Technology Convention in April 2004 and Nanotech Health Dangers Increasingly Understood around the World in January 2004 environmental security reports.] (September 2006) Ref.1480

**High Aspect Ratio Nanoparticles May Pose Asbestos-like Risks**
A consortium of UK scientists, led by the Institute of Occupational Medicine, Edinburgh, has
published a report discussing whether high aspect ratio (much longer than wide) nanoparticles (HARN), such as nanowires and carbon nanotubes, may pose the same health risks as asbestos fibers. The report concluded that there is enough evidence to suggest that HARN, which have the same physical characteristics as asbestos, are likely to induce similar pathology. The report presents a set of prioritized recommendations for future research.

Similar concerns have caused France's High Council of Public Health (HCSP) to recommend that workers in contact with carbon nanotubes receive the greatest protection under French law. Further, a new paper from Chinese researchers systematically reviews most of the experimental results on the variety of factors affecting carbon nanotubes’ cytotoxicity. (January 2009) Ref. 1481

Possible Environmental Hazard from Quantum Dots
According to an item in Nanowerk, “New research is showing that quantum dots (QDs) may be toxic to cells under acidic or alkaline conditions.” It appears that the metallic shells of these semiconductor nanocrystals, increasingly used in electronic systems, may decompose under non-neutral pH conditions, (e.g. during weathering) releasing toxic zinc or cadmium. (January 2009) Ref. 1482

Cleanup and Other Nanomaterials May Re-release Pollutants
Research by Prof. Baoshan Xing, of the Department of Plant, Soil & Insect Sciences at the University of Massachusetts has indicated that fullerenes and carbon nanotubes may exhibit reversible adsorption of polycyclic aromatic hydrocarbons, releasing into their environments toxic substances previously adsorbed by them. (September 2006) Ref.1483

Increased Research Needed to Address Environmental, Health, and Security Issues Related to Nanotechnology
The Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials report by the Nanoscale Science, Engineering, and Technology (NSET) Subcommittee of the U.S. National Science and Technology Council's Committee on Technology identifies environmental, health, and safety (EHS) research and information needs related to understanding and management of potential risks of engineered nanoscale materials.

A Matter of Size: Triennial Review of the National Nanotechnology Initiative, a new report from the National Research Council's Committee to Review the National Nanotechnology Initiative, although generally positive on the initiative's work in overseeing the U.S. government's role in developing nanotechnologies, suggests that improvements are needed mostly in the areas of measuring economic return, and addressing potential safety risks associated with nanomaterials. "The body of published research addressing the toxicological and environmental effects of engineered nanomaterials is still relatively small," states the report. Accepting the report’s recommendations, in an interview with The Scientist, E. Clayton Teague, director of the federal National Nanotechnology Coordination Office, pointed out that the federal budget for environment, health, and safety research regarding nanotechnology will expand from $38 million in 2005 to $44 million in 2007, trying to fulfill the research needs suggested by the NSET report in addressing EHS issues related to nanotechnology. (September 2006) Ref. 1484

Nanotechnology and the Food and Agriculture Sector
Nanotechnology in Agriculture and Food Production: Anticipated Applications, by Jennifer
Kuzma and Peter VerHage from the University of Minnesota's Center for Science, Technology, and Public Policy, discusses possible future nanotech-based food and agriculture applications, their potential benefits and risks, and requirements for environmental, health and safety oversight. Their investigation also resulted in creation of a searchable, online database covering more than 160 research projects. (September 2006) Ref. 1485

**Reaction to Voluntary Nanomaterial Reporting Scheme**
According to Meridian Nanotech News, "The U.K. Department for Environment, Food, and Rural Affairs (Defra) has released a document summarizing and responding to the results of a consultation it published in March seeking opinions on a 'Voluntary Reporting Scheme' for [the properties of] engineered nanomaterials." The scheme met with general support, as did its underlying evidence-based approach for determining the need for risk controls. (September 2006) Ref. 1486

**FDA Forms Internal Nanotechnology Task Force**
The US Food and Drug Administration has announced the formation of an internal Nanotechnology Task Force for determining regulatory approaches that encourage the continued development of innovative, safe and effective FDA-regulated products that use nanotechnology materials, and to identify and recommend ways to address any knowledge or policy gaps that exist, so as to better enable the agency to evaluate possible adverse health effects from FDA-regulated products that use nanotechnology materials. (August 2006) Ref. 1487

**European Commission Opens Nano2Life Network**
According to an announcement from its coordinator, "Nano2Life (N2L) is the first European Network of Excellence in nanobiotechnology supported by the European Commission under the 6th Framework Programme. Its objective is to support … [Europe's] position as a competitive player and to make it a leader in nanobiotechnology transfer by merging existing European expertise and knowledge in the field of Nanobiotechnology." It comprises 64 organizations and companies, with associate members from South Korea, Japan, Australia, and North America. One of the points in its Programme of Activity is founding the first European Ethical, Legal and Social Aspects Board (ELSA) in the field of Nanobiotechnology. This body will undoubtedly concern itself in a major way with questions of nanotechnology risk, the environment, and regulation. (August 2006) Ref. 1488

**Chinese and Russian New Nanotechnology Organizations**
The Chinese Academy of Science's National Center for Nanoscience and Technology and Institute of High Energy Physics have opened a Laboratory for Biological Effects of Nanomaterials and Nanosafety in Beijing on the IHEP campus. Russia has opened the Pilot Scientific and Technical Center of Excellence for Nanotechnology Development in Moscow. (July 2006) Ref. 1489

**UK Nanotechnology Policy Review Announced**
The UK government has asked the Council for Science and Technology to review national nanotechnology policy commitments and provide written evidence of their findings. This review is in part a follow-up to the 2004 Royal Society report, Nanoscience and nanotechnologies: opportunities and uncertainties. (July 2006) Ref. 1490
UK Review Faults Governments' Nanotech Risk Assessment Plans
The UK's Council for Science and Technology (CST) has released a review of the government's response to the recommendations on nanotech risk studies made in the Royal Society's 2004 report. The review states that the government's efforts to provide support for such research are progressing too slowly. It equally criticizes the US and other countries for similar failures. (April 2007) Ref. 1491

Nanomaterials' Biological Risks a Complex Problem
Two research projects at Rensselaer Polytechnic Institute, led by Asst. Prof. of Biomedical Engineering Deanna M. Thompson and Asst. Prof. of Earth and Environmental Sciences Anurag Sharma, have shown that the size, type, and dispersion of nanomaterials all may affect the materials' biological effects. Prof. Thompson's work dealt with the effect of nanotubes' degree of dispersion on their impact on cell growth, while Prof. Anurag's study was on long-duration effects on bacteria of nanotubes as compared with activated carbon or C60 fullerenes. (April 2007) Ref. 1492

Online Consultation on Nanomaterials Specification in EU Technical Guidance for Chemicals
According to an announcement from the EU, "The [European] Commission has … launched a public consultation of the preliminary opinion of the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) on the appropriateness of the EU Technical Guidance Documents for chemicals in regard to nanomaterials. The online consultation, which will run until 23 May 2007, aims to gather feedback on proposed modifications to the Technical Guidance Documents and on needs for further research and development." The report notes that "... special characteristics of nanomaterials - potentially differing considerably from the conventional chemicals - have to be appropriately characterised. Furthermore, their toxicological behaviour and effects on health and the environment need to be assessed properly." Further, "The SCENIHR identifies issues requiring improvements in the technical guidance and methodologies, and proposes a staged strategy for the risk assessment of nanomaterials." (April 2007) Ref. 1493

Swiss Firm Offers Nanotech Risk Assessment Data and Safety Certification
According to an article from www.in-pharmatechnologist.com, the Swiss firm The Innovation Society "has developed the Cenarios system (Certifiable Nanospecific Risk management and Monitoring System) … to collate risk related information from scientific, regulatory, technological and market sources and to generate a database of material to be applied to specific products and processes using nanotechnology." The system includes capabilities for managing risk assessment, and a continually updated database of current scientific and technical results. (March 2007) 1494

UN Environment Programme Calls for Nanotech Safeguards
UNEP’s annual report on the global environment, GEO 2007, dedicates a whole chapter, Emerging Challenges – New Findings, to nanotechnology implications for the environment, looking at ‘The environmental benefits of nanotechnology’, ‘The environmental risks of nanotechnology’, and future developments. The report notes that "swift action" is needed to adjust the legislative processes to properly address the challenges presented by nanotechnology,
with priority given to assessing the potential risks of nanomaterials already being mass-produced, and calls for global test protocols and greater cooperation between private- and public-sector industries and between the developing and industrialized worlds. (February 2007) Ref.1495

Survey Gives Insight into Effective Nanotech Education Methods
A new survey report from the University of Wisconsin-Madison Materials Research Science and Engineering Center (MRSEC) Interdisciplinary Education Group suggests improved ways of educating audiences on the nature of nanotech, and its problems and possibilities. (February 2007) Ref. 1496

New Report on Nanotechnology Applications in Water Treatment
Nanotechnology-based techniques are highly successful in removing both organic and inorganic contaminants from water. The consulting firm of Frost & Sullivan has issued a new report, Impact of Nanotechnology in Water and Wastewater Treatment, which outlines key nanotech water treatment applications and analyzes market and industry factors. It also provides a directory of contact information. (February 2007) Ref. 1497

French Research Council to Study Nanotube Toxicity
The French National Research Council (CNRS) is beginning a three-year project to study the "eco-toxicity" of carbon nanotubes, as part of a National Research Agency project. The project will investigate three main aspects: the polluting effects of nanotubes in the environment; toxicity in humans; and how to produce nanotubes using cleaner methods. (February 2007) Ref.1498

European Guide to Green Masters Programs Launched
The Institute of Nanotechnology has announced the official launch of the European Nanotechnology Masters Recognition Scheme, for 10:30 a.m., 20 June 2007, at the Congress Center, Düsseldorf, as part of EuroNanoforum 2007, The Scheme site, which can be visited at http://www.nano.org.uk/nanomasters/, offers online access to descriptions of nanotechnology-related master's degree programs throughout Europe. (May 2007) Ref. 1499

Toxic Metals Carried into Cells by Nanoparticles
Scientists at the Swiss Federal Institute of Technology (ETH) Zurich and the Swiss Federal Laboratories for Materials Testing have discovered that metal oxide nanoparticles had up to 8 times the toxicity of the same metals in salt forms when brought into contact with lung epithelial cells. The explanation by one researcher is that "cell membranes provide a selective barrier against ions, preventing the dissolved metal salts from entering. Once a metal-containing nanoparticle has penetrated a cell, however, metal ions can leach from the particle and generate ROS [reactive oxygen species] in the cell interior". The degree of the toxicity is related to the specific metal being introduced. (May 2007) Ref.1500

Nanotechnology Health Concerns Highlight Need for International Technology Convention
Buckyballs are spheres formed by a specific number and arrangement of carbon atoms. They are very important for a range of nanotechnology applications, but according to research presented at
a recent meeting of the American Chemical Society, Buckyballs can cause extensive brain damage in fish. Other studies have shown that such particles can enter the brain. The fish studies, however, were the first to link nanoparticles to the destruction of brain tissue. Additional studies are underway to determine if coating such nanoparticles affects toxicity.

In reaction to this and other nanotechnology-related health issues, the ETC Group suggests, “The international community must formulate a legally-binding mechanism to govern the products of new technologies, based on the Precautionary Principle, one that addresses their health, socio-economic and environmental implications. International assessment should be incorporated under a new International Convention for the Evaluation of New Technologies (ICENT).” (April 2004) Ref.1501

Industry/Environmentalist Cooperative Effort on Nanotechnology Risks
DuPont and Environmental Defense recently agreed to collaborate on a framework for the responsible development, production, use and disposal of nanomaterials. According to a statement, its intent is "to define a systematic and disciplined process that can be used to identify, manage and reduce potential health, safety and environmental risks of nano-scale materials across all lifecycle stages. This framework will then be pilot-tested on specific nano-scale materials or applications of commercial interest to DuPont". (October 2005) Ref. 1502

Low Environmental Risk from Nanomaterial Manufacturing
A new study from Rice University compares the environmental and health risks associated with the production of five nanomaterials—single-walled carbon nanotubes, buckyballs, zinc selenide quantum dots, alumoxane nanoparticles and titanium dioxide nanoparticles—with the risks of making six everyday products—silicon wafers, wine, high-density plastic, lead-acid car batteries, refined petroleum and aspirin. Using end-to-end analysis of the manufacturing processes, the research team concluded that they present environmental risks no greater than do the technologies in such industries as oil refining, or wine or aspirin production. It should be noted that this work dealt only with possible hazards in manufacturing nanomaterials, not in utilizing them in products. The study is planned for publication in the 15 November issue of Environmental Science and Technology. (October 2005) Ref. 1503

Nanomaterials in Drinking Water May be Hazardous
Preliminary results from research at Arizona State University indicate that the presence of certain nanomaterials in drinking water may be hazardous to intestinal cells. A layer of colon cells was broken down when exposed to a simulated intestinal fluid containing titanium dioxide particles. Further, the experiment showed that such a breakdown would allow the particles to pass into other parts of the body. The next phase of the effort will examine the potential adverse effects of the nanomaterials inside cell tissue. (October 2005) Ref.1504

Roadmap for Characterizing Nanomaterial Health Effects
Principles for characterizing the potential human health effects from exposure to nanomaterials: elements of a screening strategy, a report sponsored by the EPA, details the various ways in which nanoparticles can be characterized (shape, size, electrical properties, etc.) and the kinds of tests that can be carried out to determine their effects, in different contact modes, on anatomical and physiological elements in the body. (October 2005) Ref. 1505
Nanotechnology—Health Implications of Quantum Dots

Quantum dots (QD) are nanoparticles that consist of a metalloid core and a shell that surrounds the core and makes the particle biologically active. They form an important class of elements in nanotech-based applications, particularly biological ones, but raise the same environmental safety questions as other nanomaterials. A recent toxicological review of QD at Duke Univ. indicated that:

- "QD toxicity depends on multiple factors including their physico-chemical properties (e.g. size, charge, concentration, outer coating bioactivity, and stability) and environmental conditions."

- "Human exposure to QD may result from environmental, workplace and therapeutic exposure. There may be a risk of bioaccumulation of these materials within organs and tissues (e.g. in lungs) with still unexplored or under-explored health risks."

- QDs may enter the environment in wastes from any (QD) activity, their persistence may be long, and the exposure risk varies with the host material - water, air, or various soil types.

- The principal concern with QD relates to the possible effects from toxic metals (e.g. Cd, Se) in the metalloid core, in particular as determined by the physical, chemical, and physiological properties of the core/coating complex. Some in vitro studies suggest that prolonged exposure may be toxic to cells.

[See also Nanotechnology in January 2006 and previous environmental security reports.] (February 2006) Ref. 1506

Nanotechnology: Environmental Implications and Solutions

According to a review in US National Institute of Health’s (NIH) Environmental Health Perspectives, this new book "gives an excellent summary of traditional environmental pollution issues", but "may disappoint those who expect dramatic revelations about nanoparticles as pollutants". One chapter gives a good summary of the production and applications of nanomaterials, but in general the work is wanting in nano-specific information, except, to some extent, in the section on air pollution (albeit with several errors). (July 2005) Ref. 1507

UK Launches $8.5M Nanotech Risk Research

As a follow-up to the 2004 study into the risks and benefits of nanotechnology, the UK government's Department for the Environment, Food and Rural Affairs has announced an $8.5 million research plan to identify long-term environmental and health risks from the technology. The new program should lead to a framework for containing any "unacceptable risks" associated with nanotechnology. The study had three foci, to: 1) understand the physical and chemical properties of nanoparticles; 2) determine the avenues of exposure to them; and 3) assess their possible human health impacts. The report describing the effort identifies 19 research objectives and describes ways in which they could be funded. [See also Progress on Establishing Frameworks for Responsible Nanotechnologies in October 2005, Nanotechnology Assessment Reports in March 2005, and New UK Study on Future Impacts of Nanotechnology in August 2004 environmental security reports.] (December 2005) Ref. 1508

New Database of Nanotechnology Risk Studies

The Project on Emerging Nanotechnologies at the Woodrow Wilson International Center for...
Scholars in Washington has just established an on-line database intended to provide information on nanotech risk projects worldwide. Although it currently contains U.S government-sponsored research, it is planned to be international and comprehensive. (December 2005) Ref.1509

EPA Nanotechnology White Paper
The U.S. Environmental Protection Agency released a draft paper that identifies gaps and research needed for better understanding the environmental and health implications of nanotechnology and for designing appropriate regulatory safeguards. After presenting the current state of nanotech, the paper suggests recommendations on next steps for addressing science policy issues and research needs and even indicates that the complexities of nanotechnology are too much for a single government agency to handle. (December 2005) Ref.1510

German NanoCare Project to Evaluate Nanoparticles
This month marks the beginning of the NanoCare project under the auspices of the German Ministry of Education and Research. This project brings together thirteen companies, universities and research institutes, and focuses on "the properties of nanoparticles to ensure that they pose no risk to humans and the environment when used in chemical materials." It will operate for three years and has €7.6 million in funding from government and industry. (March 2006) Ref.1511

Nanotech Consumer Products Data Base
The Emerging Nanotechnologies Project of the Woodrow Wilson International Center for Scholars has launched the first publicly accessible on-line ‘Nanotechnology Consumer Products Inventory.’ The database lists over 200 nanotech-related consumer products by name, manufacturer, country of origin, and category, and includes a product photograph, description, and Web link. The database is available at http://www.nanotechproject.org/index.php?id=44 and is still being expanded. (March 2006) Ref.1512

New Patent Office Nanotech Index Should Speed Research
The U.S. Patent and Trademark Office is about to unveil its new expanded classification schedule for its cross-reference art collection (XRAC) of Nanotechnology, Class 977, material. This schedule will have 263 new subclasses (or categories) in which nanotech-related items can be filed and organized, compared to only one massive subclass at present. (January 2006) Ref.1513

Nanotech Health, Safety, and Environment Working Group Set Up by ISO/ANSI
A result of the inaugural meeting of the International Organization for Standardization (ISO) Technical Committee 229, Nanotechnologies, held in London, November 9-11, 2005, was the establishment of a working group on health, safety and the environment, to be convened by the United States within the American National Standards Institute (ANSI) framework. The group will work on standards for environmental issues involving nanomaterials. [See also ISO to Establish Standardization in the Field of Nanotechnologies in the October 2005 environmental security report.] (November 2005) Ref.1514

NIOSH to Form Field Research Team for Assessing Nanotechnology Processes Safety
The National Institute for Occupational Safety and Health (NIOSH) will form an
interdisciplinary Field Research Team for assessing occupational health and safety practices related to nanotechnology operations. The interdisciplinary team will include researchers representing areas such as industrial hygiene, engineering, occupational medicine, and risk assessment, who will serve in limited-time assignments in the field, in those locations where nanomaterials are developed or utilized. The information and insight provided by the team will periodically update NIOSH’s “Approaches to Safe Nanotechnology” on-line guidance document www.cdc.gov/niosh/topics/nanotech/nano_exchange.html. (January 2006) Ref.1515

Managing the Effects of Nanotechnology
Managing the Effects of Nanotechnology by J. Clarence (Terry) Davies, is a comprehensive overview of the existing legal framework that would apply to nanotechnology, and outlines aspects that should be covered by new regulations. The author notes the need for a “right regulatory framework for nanotechnology--framework that encourages initiative and innovation, while also protecting the public and the environment.” (January 2006) Ref.1516

Lux Report Addressing Nanotech Health, Environmental, and Safety Risks
Nanotechnology’s environmental, health, and safety (EHS) risks can be addressed responsibly today, states a new Lux Research report, A Prudent Approach to Nanotech Environmental, Health, and Safety Risks. Explaining different types of risks associated with nanotechnology, Lux estimates that of $8 trillion projected manufacturing output using some nanotechnology through 2014, 25% is exposed to real risk at manufacturing (which should be easiest to mitigate), 7% is exposed to real risk at use, 14% is exposed to risk at end-of-life, while 40% is exposed to perceptual risk. The report states that risks can be effectively addressed today by using well-established risk management techniques, and it also suggests that specific actions from corporations, start-ups, investors, and governments are needed to address nanotech EHS risks. It comments that U.S. government funding for nanotech EHS risk assessment should be increased from the present earmarked 3.7% of the $1.05 billion U.S. National Nanotechnology Initiative budget for 2006. [See also item 9.4 Nanotechnology: Environmental Implications and Solutions in May 2005 environmental security monthly report.]
Note: on June 29, 2005 Lux Research released Nanotechnology: Where Does the U.S. Stand? “assessing how U.S. research and business activities in nanotech measure up to those of international competitors.” (Report available only to Lux Research clients) (June 2005) Ref.1517

European Nanotechnology Action Plan
The European Commission has announced its Action Plan to improve European competitiveness in nanotechnology. The plan outlines European-wide and national measures to strengthen nanotechnology research and implementation in a safe and responsible way. The measures in the action plan include: boosting funding—including research to assess possible impact on human health and the environment; respect of ethical principles and citizens’ concerns and expectations; building risk assessment into the research and developing guidelines for such risk assessment (including reassessment of existing EU legislation); full access of the public to research; strengthening international dialogue on common issues; and improved infrastructure. The plan also calls for a legislative review, which may lead to future treaty provisions. (June 2005) Ref.1518
Buckyballs Could Damage DNA
Using computer simulations, researchers at Oak Ridge National Laboratory in Tennessee, and Vanderbilt University found that buckyballs bind strongly to DNA, distorting the strands, which could interfere with the DNA’s function, disrupting replication and repair and increasing mutation rates. However, the researchers admit that only actual experiments could determine buckyballs’ impact on DNA in the real world. (December 2005) Ref.1519

Buckyballs no Risk to DNA
Reacting to last month’s remarks on possible dangers that "buckyballs" could present to human DNA, Dr. Hicham Fenniri, senior researcher at the National Institute for Nanotechnology in Edmonton, Canada, comments that there are no such risks. He explains that since buckyballs are not soluble in water, it would be difficult for them to reach the DNA to damage it. [See also Buckyballs Could Damage DNA in December 2005 environmental security report.] (January 2006) Ref. 1520

Grant for Review of Best Practices in Nanotech Safety
Researchers at the University of California, Santa Barbara received a grant from the International Council on Nanotechnology (ICON), a multi-sectoral consortium, to conduct a "Review of Best Practices for Nanotechnology Safety", to be completed by the end of 2006. The first phase will involve a comprehensive review of all existing "best practice" development efforts. The second will conduct interviews of a broad range of companies internationally to determine current practices, having as a goal, "to identify critical needs for the standardization and implementation of safe practices in the nanotechnology industry in different parts of the globe." A project official, Barbara Herr Harthorn, commented, "The ICON-funded study will provide essential data on current nanotech industry standards and practices for enhancing the environmental and health safety of nanomaterials. By providing comparative data on companies in the US, Europe and Asia, it will help shed light on new safety models as they are being implemented and also help identify where they are most needed. This work will provide important baseline data for … research … UCSB is planning on risk and society issues." (March 2006) Ref.1521

Upcoming Conferences on Nanotechnology Safety
A conference on "Nanoparticles for European Industry – Manufacture, Scale-Up, Stabilization, Characterization and Toxicology" will be held 2-3 May 2006, at the Olympia Conference Centre, London. The meeting, sponsored by the Institute of Nanotechnology and the European Nanotechnology Trade Alliance, will present the latest views on issues of critical importance to industry, including innovations in manufacturing techniques, and scale-up and stabilization of nanoparticles. The conference will include sessions on toxicology and characterization, plus presentations on current approaches to regulation.

The International Symposium on Nanotechnology in Environmental Protection and Pollution will be held in Hong Kong, China 18-21 June 2006. One of the three sections of the Symposium is directed toward Nanotechnology Toxicity and Environmental Pollution, including Environmental Cleanup, Filters and Membranes, Nanoelectromechanical Systems (NEMS) and Advanced Devices for Environmental Monitoring, Environmental Impact and Assessment, Nanotechnology Defense, Responsible Commercialization, and Nanotechnology Industry Standards. (March 2006) Ref.1522
Nanotechnology’s Bottom-up Approach Gets a Boost
Foresight Nanotech Institute and Battelle Memorial Institute will lead a broadly based project to create a nanotechnology roadmap to help investment become more strategic and help set goals. The roadmap will focus on a bottom-up approach to nanotechnology based on productive nanosystems, using molecular machines to make larger products, scaling up to desktop manufacturing systems. The current approach mostly focuses on the reverse: large machines making smaller things like nanotubes, and other arrangements of molecules and atoms. The roadmap will describe a step-by-step development process starting with today's laboratory capabilities and providing useful products at every stage. Creating a roadmap that includes a broader range of approaches to nanotechnology will make cost, benefits, and time-to-impact judgments more clear for all. Such a roadmap may also assist future developers of international agreements on nanotechnology standards and trade. (June 2005) Ref.1523

Nanotechnology Protest
A group of environmental protesters disrobed in front of a high-end Madison Avenue clothing store in New York City to bring media attention against nanotech clothing that has stain-resistant nanotechnology-treated fabrics. This may be an early incident in a new anti-nanotech campaign that could grow into a major movement condemning uses of these new techniques. The situation is exacerbated by the very real lack of comprehensive scientific research on nanotechnology risks, and certainly by lack of public awareness of what is known about the hazards. (June 2005) Ref. 1524

Nanoparticulates environmental pollution and health risk might trigger international regulatory agreements
Nanoparticulate (less than 100 nanometers in size) pollution has been shown to enter the bloodstream and brain after being inhaled. In addition to causing damage at the point of entry to the body, nanoparticulate pollution has been shown to cause lung damage and has been implicated in cardiovascular disease. Since the field of nanotechnology is new, no long-term studies of occupational exposure to nanoparticulate pollution have yet been performed. Like any other form health threat and environmental pollution, nanoparticulates are likely to find their way into international regulatory agreements. US EPA and the Woodrow Wilson Center’s Program on Governance and Foresight have held seminars on this new form of pollution and health risk. (January 2004) Ref.1525

Nanotech Safety and Health Issues
A meeting was held in Washington on 18 May at which officials from the Dept. of Labor's Occupational Safety and Health Administration (OSHA) and CDC's National Institute of Occupational Safety and Health (NIOSH) discussed with interested parties from government and business the current state of work on the relationship between nanotechnology and worker safety and health. The major conclusion to be drawn from the meeting is that almost no data on this problem is yet available. Both agencies are conducting and sponsoring research in the area, but even fundamental information on the mechanisms involved, such as dermal absorption, and the role of metal particles embedded in nanomaterials, is lacking. It is estimated that there will be a million new nanotechnology workers, and there are many programs underway to clarify the safety and health situation. (May 2004) Ref.1526
Genetic Engineering, Nanotechnology, and Robotics Technology Forecast—calls for “rapidly develop ethical and legal standards and defensive technologies”

“Promise and Peril of the 21st Century” by the futurist and inventor Ray Kurzweil is an interesting forecast of genetic engineering, nanotechnology, and robotics (GNR) technologies and their implications. He offers warnings on threats posed by nanotechnology, as well as those of its control and access. Further, he calls attention to “the vital task in front of us: to rapidly develop ethical and legal standards and defensive technologies that will be essential to our security. This is a race, and there is no alternative.”

Similarly, an International Herald Tribune article, “Research alert: small can kill” based on DuPont research, draws attention to the fact that assessing the potential environmental and health impacts of nanomaterials could take years, being much outpaced by the rate of industrial adoption of nanotechnology. (November 2003) Ref.1527

International Council on Nanotechnology (ICON) Created
The International Council on Nanotechnology (ICON) is a coalition of academic, industry, regulatory, and non-governmental organizations working together to ensure that nanotechnology benefits humanity without negative implications for health and the environment. ICON activities’ categories include: science and engineering research into the potential environmental and health impacts of engineered nanostructures; social science research into public perceptions toward new technology, and the role that regulatory and other governmental policies can and should play in nanotechnology stewardship; collaborative policy activities that develop international standards for engineered nanostructure terminology and metrology, safety guidelines, and best laboratory practices; public communication and outreach that tracks all relevant technical data on nanotechnology's potential risks; and presentation of this information in terms and formats that are accessible by laypersons. ICON is located and coordinated by The Center for Biological and Environmental Nanotechnology (CBEN) at Rice University. (November 2004) Ref.1528

Wise-Nano Project of the Center for Responsible Nanotechnology
The Wise-Nano project of the Center for Responsible Nanotechnology is a collaborative website for researchers from around the world addressing the facts and implications of advanced nanotechnology and what to do about them. (November 2004) Ref.1529

Nanotechnology Assessment Reports

*Scientific Forward Look on Nanomedicine* is a foresight study by the European Science Foundation, assessing the application of nanotechnology to medicine. This study included over 100 international experts from academia, industry, private foundations and governmental agencies, who reviewed future developments, opportunities and challenges facing this emerging field worldwide. The study analyzes the current state-of-the-art in nanomedicine, identifies Europe's strengths and weaknesses, and provides recommendations on future research priorities and organizational matters.

*Response To The Royal Society And Royal Academy Of Engineering Report: ‘Nanoscience and nanotechnologies: opportunities and uncertainties’* is a ‘response report’ to the independent study conducted by the UK Royal Society and the Royal Academy of Engineering (published in July 2004) on the opportunities and uncertainties concerning nanotechnology to ensure that England has an adequate regulatory system for responsible nanotechnology development. This
‘response report’ sets out the UK Government’s agenda on nanotechnologies; and will be reviewed by an independent body after two and five years.

‘Potential Environmental Pollution and Health Hazards Resulting from Possible Military Uses of Nanotechnology with Implications for Research Priorities Helpful to Prevent and/or Reduce Such Pollution and Hazards’ is the result of a two-round Delphi by the Millennium Project of the American Council for the UNU that assembled a 25-member expert panel to identify and rate these issues. (March 2005) Ref.1530

**ETC Report on Nanotechnology Impact on Food and Agriculture**

The ETC Group recently released a report, "Down on the Farm: The Impact of Nano-Scale Technologies on Food and Agriculture", that addresses nanotechnologies’ impact on farmers, food and agriculture. The report recommends that until the clear implications of nanotechnology use in agriculture and food chain are known, its use be guided by the Precautionary Principle or even prohibited until a regulatory regime specifically designed to examine these nano-scale products finds them safe. The report also addresses the ‘green goo’ issue related to potential dangers associated with synthetic biology or nanobiotechnology and, given the extreme risks (that even mainstream scientists are beginning to acknowledge), calls for an immediate moratorium on laboratory experimentation and environmental release of these materials until there is thorough knowledge of their health, environmental and socio-economic implications. (November 2004) Ref.1531

**Nanotechnology Forecasting and Assessment Programs**

The Project on Emerging Nanotechnologies launched by the Woodrow Wilson Center (WWC) and the Pew Charitable Trusts will assess possible health and environmental implications of nanotechnology and potential nanotechnology risk management strategies. It will be a reliable source of information for businesses, governments, and the public through reports, analyses and regular meetings with leaders in the field.

The Institute of Nanotechnology, a global leader in nanotechnology matters, will officially launch the European Nanotechnology Trade Association (ENTA), on June 1, 2005, to act as an interface between nanotechnology businesses across Europe and: governments, science and industry policy makers; and the public and watchdog organizations ‘to ensure transparency and that new nanotechnologies are developed in a safe and responsible manner.’ (April 2005) Ref.1532

The U.S. Environmental Protection Agency (EPA) awarded 12 grants to universities to investigate the potential health and environmental impacts of nanomaterials. Six of the grants awarded will investigate if manufactured nanomaterials could have any negative health effects or environmental impacts, while the other six grants will study the fate and transport of nanomaterials in the environment. The grants were awarded through EPA's Science to Achieve Results research grants program.

The National Toxicology Program, a part of the U.S. National Institutes of Health, will be conducting animal studies to investigate the effects of nanoparticles in the lungs and on the skin, and their uptake and distribution into and through the body.

Other U.S. agencies, including the Occupational Safety and Health Administration and the Food and Drug Administration, have also begun to pay attention to the field. (November 2004) Ref.1533
Studies on Potential Environmental and Health Impacts of Nanotechnology

_Nanoscience and Nanotechnologies: Opportunities and Uncertainties_, by the UK Royal Society and the Royal Academy of Engineering reviews the state of knowledge and ignorance about potential health, safety and environmental impacts of nanotechnology, plus an assessment of the social and ethical issues of its future. Although clearly stipulating that there is no ground for a moratorium on nanotechnology research, the report calls for more research into the health, safety, and environmental impacts of nanotech. It recommends establishment of “an Interdisciplinary centre (probably comprising several existing research institutions) to undertake research into the toxicity, epidemiology, biopersistence and bioaccumulation of manufactured nanoparticles, their exposure pathways, and methods and instrumentation for monitoring them in the environment.” (August 2004) Ref.1534

_Nanotechnology and worker safety and health_

A meeting was held in Washington on 18 May at which officials from the Dept. of Labor's Occupational Safety and Health Administration (OSHA) and CDC's National Institute of Occupational Safety and Health (NIOSH) discussed with interested parties from government and business the current state of work on the relationship between nanotechnology and worker safety and health. The major conclusion to be drawn from the meeting is that almost no data on this problem is yet available. Both agencies are conducting and sponsoring research in the area, but even fundamental information on the mechanisms involved, such as dermal absorption, and the role of metal particles embedded in nanomaterials, is lacking. It is estimated that there will be a million new nanotechnology workers, and there are many programs underway to clarify the safety and health situation. (May 2004) Ref.1535

_Implications of Nanotechnology for Environmental Health Research_ comprises the results of a workshop by the Institute of Medicine’s Roundtable on Environmental Health Sciences, Research and Medicine, aiming to assesses promises and implications of nanotechnology in order to develop a research agenda to address critical issues related to the impact of nanotechnology on health and the environment. In addressing priorities, policy, and government implications, the report concludes that for efficient assessment of potential hazards of nanotechnology, the following are required: an adequate nomenclature; an effective risk-benefit analysis; and both a research framework and strong leadership. (April 2005) Ref.1536

_Buckyballs Might Affect the Environment_

Scientists have found that buckyballs (the C60 hollow molecule nanospheres), envisioned for use in a wide variety of applications, are soluble in water, and influence the functioning of bacteria. So far, research shows that the particles at a concentration of 0.5 parts per million inhibited bacterial growth and respiration. Several features influence their behavior, including water’s Ph. Thus, buckyballs are not biologically inert. This reveals that more research is necessary to understand buckyballs’ behaviors and influences on the environment, and to guide the development of any eventual regulations concerning nanotechnology applications. (May 2005) Ref.1537

_Nanotechnology: Environmental Implications and Solutions_

Although the book review in Small Times says that the title is overstated—the book not offering “solutions”—it presents a comprehensive overview of today’s environmental regulations and their current status, addresses pollution issues including control techniques, and does an assessment of nanotechnology referring to its potential health risks, risk communication, and ethical issues. The book appears to be a good source of information both for environmentalists—explaining nanotechnology – and for nanotech scientists—informing about environmental
Soot Particulates may cause genetic mutations in mice

McMaster University researchers reported that mice breathing filtered air have 52% lower mutation rates that those mice exposed to soot in open air from a steel mill. It is not known if such particles can make their way through the blood system to affect sperm-forming cells. Although more research is needed, and it is currently unknown if people could inherit pollution-damaged DNA, this is a new area for serious attention. It is clear that High Efficiency Particulate Air (HEPA) electronic filters offer an effective way of removing particulate matter from the air. (May 2004) Ref.1538

Study Finds TiO$_2$ Nanoparticles as Possibly Brain-damaging

Preliminary results in a new study from EPA’s National Health and Environmental Effects Research Laboratory indicate that titanium dioxide nanoparticles may cause a reaction that could seriously damage brain cells. The particles trigger the release from some cells of biologically active molecules, known as reactive oxygen species (ROS), which can damage surrounding cells. (June 2006) Ref.1540

Two New Nanotech-based Power Source Improvements

Nanotechnology has pointed the way to two new improvements in portable power sources, suitable for environment-sensing devices. In the first, a team under Prof. Joel Schindall of the Laboratory for Electromagnetic and Electronic Systems at MIT has developed a capacitor whose electrodes are covered with a forest of millions of nanotubes, enormously increasing their effective surface area, the governing factor for the amount of charge a capacitor can hold. Such a device can compete with a conventional battery in terms of the total amount of power it can deliver over a period of time, and, since it does not involve a chemical reaction, has the added advantages that it is almost instantly chargeable and would not wear out with hundreds of thousands of recharging cycles, avoiding the used battery disposal problem.

The other new technology comes from France, where Prof. Patrice Simon of the Université Paul Sabatier, who was aided also by colleagues at the Université Picardie Jules Verne, describes the development of lithium-ion battery electrodes that have several times the energy capacity by weight and volume of existing electrodes. As in the scheme above, the electrodes are covered with a forest of nanotubes. This 3D configuration provides 50 sq cm of active area for each sq cm of base area. (June 2006) Ref.1541

Addressing Nanotechnology Risks

Citing gaps in regulating future uses of nanotechnology (including those relating to particle size, the use of nano versions of already approved ingredients, and packaging), the British Food Standards Agency suggests in its recently released regulatory review that legislation be speedily amended to require that all nanocomponents be subject to their own risk assessment. The Royal Society has also issued a statement, following up its 2004 report on nano hazards, saying that Industry should disclose how it tests products containing nanoparticles. Further, the Department for Environment, Food and Rural Affairs (Defra) is currently working on extending their regulatory framework to include nanomaterials.

Germany also is also beginning a risk survey on nanotechnology in food, cosmetics, and other commercial products. The survey will be conducted by ZIRN (Center of Interdisciplinary
Risk-science and Sustainable Development of Technology) and will investigate current and future nanotechnology applications, as well as potential risks. Its results will be discussed in two subsequent workshops and then transformed into a "risk barometer" for the information of the public. They could also lead to new regulations.

_Nano-Regulation: A multi-stakeholder-dialogue-approach towards a sustainable regulatory framework for nanotechnologies and nanosciences_ report has been issued by the Innovation Society Ltd., an independent consulting company, based at the Technology Centre of the Federal Institute of Materials Science & Technology (EMPA) in St. Gallen, Switzerland, as part of its Platform “Nano-Regulation” project, in cooperation with NanoEurope and NanoCluster Bodensee. The report presents the results of a Delphi process undertaken with 35 expert representatives of all stakeholder communities in nano regulation.

Nanoforum, an all-Europe nanotechnology network funded by the EU and its Institute for Environment and Sustainability, has released a report outlining the conclusions from its workshop, ‘Nano and the Environment’ held in Brussels in March 2006. The workshop brought together stakeholders from all sectors of the nanotech world to discuss key issues surrounding nanotechnology and the environment, including monitoring, pollution and remediation, and resource saving. The report covers detection of air and water pollutants; life-cycle analysis; applications for energy sustainability; risk assessment; nanotechnology applications for remediation of environmental toxins; commercialization; challenges of communication within the nanotech field, regulatory policy initiatives; public education; and societal and ethical implications.

Along the same lines, _Taking Action on Nanotech Environmental, Health, and Safety Risks_, report by Lux Research, concludes that nanotechnology environmental, health, and safety risks have to be promptly addressed, urging the government to consider comprehensive and clear regulations. (June 2006) Ref.1542

Recent results have shown the need for great care in interpreting results on the toxicity of nanotubes and other nano materials. They show major differences between in vitro and in vivo tests, (June 2006) Ref.1543

Assessing exposure to airborne nanomaterials: Current abilities and future requirements. (April 2007) Ref. 1544

Informa Healthcare has started publication of a new quarterly journal, Nanotoxicology, in both online and print versions. Information about it can be found at http://www.informaworld.com/smpp/title~content=t716100760

The inaugural issue features a 16-page article, _Assessing Exposure to Airborne Nanomaterials: Current Abilities and Future Requirements,_ written by Andrew Maynard, chief science advisor at the Wilson Center's Project on Emerging Nanotechnologies, and Robert Aitken, director of strategic consulting at the Institute of Occupational Medicine (Edinburgh, UK) (April 2007) Ref.1545

The Institute for Food and Agricultural Standards (IFAS) at Michigan State University has released a 32-page report, _An Issues Landscape for Nanotechnology Standards: Report of a Workshop_. According to the announcement, "The report discusses critical issues surrounding five standards themes affecting …nanotechnologies … (1) timing and standards-setting, (2) product
vs. process standards, (3) international harmonization, (4) integration of operational standards, and (5) participation and transparency." (April 2007) Ref.1546

Nanotech Products Meeting to Be Held in London, 16-17 May—updated information is now available at www.nano.org.uk/events/ionevents.htm The meeting examined nanotechnologies that are described as "offering real environmental benefit, and will also review the findings of the recently published STOA report on the Role of Nanotechnology in Chemical Substitution." (April 2007) Ref.1547

The International Council on Nanotechnology and the University of California at Santa Barbara have issued a new report, *A Review of Current Practices in the Nanotechnology Industry*, the second in a series. [See *Review of Safety Practices in the Nanotechnology Industry*]. According to the announcement, it is "the first comprehensive, international survey of workplace safety practices in the nanotechnology industry" and "documents results from survey data collected from 64 organizations in North America, the European Union, Asia and Australia." The release also says it, ..."finds that many nanotech companies and laboratories believe nanoparticles … may pose specific environmental and health risks for workers. In response, companies are reporting that they are developing special programs and procedures for mitigating risks to workers and consumers. Yet, due in part to a lack of general information regarding nanomaterials risks, companies and labs have workers using conventional environmental, health and safety (EHS) practices when handling nanomaterials, even though the practices were developed to deal with bulk materials that can have markedly different chemical properties than their nano-sized counterparts." The Director of ICON says "The use of conventional practices for handling nanomaterials appears to stem from a lack of information on the toxicological properties of nanomaterials, as well as nascent regulatory guidance regarding the proper environmental, health and safety practices that should be used with them." (November 2006) Ref.1548

**RCRA Regulation of Wastes from the Production, Use, and Disposal of Nanomaterials**, by the American Bar Association's Section of Environment, Energy, and Resources, discusses a number of issues related to the EPA's regulation of nanomaterial wastes under the Resources Conservation and Recovery Act (RCRA). Topics include the possible need for new definitions of hazardous nanomaterial characteristics, injunctive relief against imminent and significant risks, and the current practice of relying on the waste generator's process knowledge. (August 2006) Ref.1549


The new report by Woodrow Wilson International Center's Project on Emerging Nanotechnologies, *Nanotechnology: A Research Strategy for Addressing Risk*, makes several recommendations for nanotechnology risk assessment, including that the government: institute a top-down strategic framework for risk-based nanotechnology research, prioritize research, establish joint industry funding, and coordinate research activities internationally. (August 2006) Ref.1550

The final report of Defra (UK organization), *Environmental Regulatory Gaps Study on*
Nanotechnologies, addresses environmental regulation gaps concerning potential risks posed by products and applications of nanotechnologies, and it identifies measures that can be put in place to ensure adequate protection for human health and the environment. It is a comprehensive overview, analyzing each sector concerning nanotech—from substances, production and application, to environmental impacts—with respect to existing regulations, and highlighting the eventual gaps. (August 2006) Ref.1551

The International Risk Governance Council (www.irgc.org) has issued a white paper, Nanotechnology Risk Governance, which uses the IRGC’s risk governance framework, published in 2005, to analyze and identify current deficits in nanotechnology risk governance, separately considering current and future developments. It then offers initial recommendations for how decision makers may choose to deal with these risk governance gaps. These recommendations will be subject to further work, including discussions with appropriate stakeholders. (July 2006) Ref.1552

The UNESCO World Commission on the Ethics of Scientific Knowledge and Technology has published a 25-page report, The Ethics and Politics of Nanotechnology. The work discusses "Nanotechnology Research Now" and "Ethical, legal, and political implications of nanotech", and it concludes with a list of the most recent reports that have been released covering nanotechnology, its implications, and the social, political and ethical issues surrounding it. (July 2006) Ref.1553

The European Commission Scientific Committee on Emerging and Newly Identified Health Risks has issued a 79-page "modified opinion" on the appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nanotechnologies. This report discusses in detail the scientific rationale, including risk assessment methodologies and prioritization of needs in knowledge, and concludes with Committee and minority opinions, and references. (July 2006) Ref.1554

CDC's National Institute for Occupational Safety and Health (NIOSH) has announced the release of a new progress report, Progress Toward Safe Nanotechnology in the Workplace, which, according to the release, details the advancements made by NIOSH in advancing scientific knowledge in understanding the occupational safety and health implications of engineered nanoparticles, and also suggests potential areas where future research could further expand this knowledge. (March 2007) Ref.1555

National Nanotech Initiative Issues Risk Assessment Report
The US National Nanotechnology Initiative has issued a report, Understanding Risk Assessment of Nanotechnology, which manages in eight pages to offer a comprehensive, technically oriented introduction to nanotech risk assessment. The document contains 44 endnotes, listing hundreds of Web sites and paper citations. (March 2007) Ref.1556

EPA Publishes White Paper on Nanotechnology
The US Environmental Protection Agency has issued a Nanotechnology White Paper. The 132-page document describes nanotech and its benefits and risks, and discusses risks assessment issues and research needs and priorities. An appendix contains a description of EPA's framework for nanotechnology research. (March 2007) Ref.1557
The Millennium Project

The International Council on Nanotechnology (ICON) and Rice University's Center for Biological and Environmental Nanotechnology (CBEN) have been maintaining an online database of references to current work in nanotech environmental health and safety issues. They have now announced the launch of a new monthly online review journal, The Virtual Journal of Nanotechnology Environment, Health & Safety (VJ-Nano EHS). The new publication will contain primarily items added to the database during the current month, so that users can easily keep up with progress in the field. The site will also provide a series of occasional papers, access to the whole database, and a capability for search by a number of different aspects of the work reported, such as risk exposure group, particle type, and exposure pathway. The journal may be accessed at http://icon.rice.edu/virtualjournal.cfm. (March 2007) Ref.1558

Green Nanotechnology: It's Easier Than You Think, from the Project on Emerging Nanotechnologies of the Woodrow Wilson International Center, discusses links between nanotechnology and environmentally friendly development and production. It also presents recommendations for proactive federal policy measures to encourage such applications of nanotech. (May 2007) Ref.1559

Some Conferences on Nanotechnology with Environmental Security Implications

EuroNanoForum 2009 to Be Held in Prague, June 2-5, 2009
The fourth international nanotechnology conference, EuroNanoForum 2009, an official event of the EU, will be held in Prague, June 2-5, 2009, with the topic “Nanotechnology for a Sustainable Economy”. Among the individual sessions will be “Environmental applications and implications of nanotechnology” and “Nanotechnology: education, standardization and social perception of benefits and risks”. (December 2008) Ref. 1561

Indian Conference on Nanotechnology and Regulatory Issues
An Indian National Conference on Nanotechnology and Regulatory Issues is scheduled January 9-10, 2009 at the Centre for NanoScience and Nanotechnology, Saltlake City, Kolkata. The purpose of the conference is to bring together policymakers, nanoscientists, lawyers and academicians to debate and discuss a range of issues relating to nanotechnology regulation in India. (October 2008) Ref.1562

International Environmental Nanotechnology Conference 2008
The 2008 International Environmental Nanotechnology Conference: Applications and Implications will be held 7-9 October in Chicago IL. According to the announcement, “The conference will bring together researchers and practitioners from around the world to discuss the nanotechnology applications for remediation of environmental contaminants; the implications of releasing manufactured nanoparticles into the environment, and pollution control and nano-enabled sensing.” (September 2008) Ref.1563

Nanoparticle Warnings at Euroscience Open Forum
Two speakers at the Euroscience Open Forum in Barcelona discussed the need for more research on the environmental risks posed by nanoparticles. Hermann Stamm, head of nanotechnology and molecular imaging at the Institute for Health and Consumer Protection in the European
Commission's Joint Research Council brought up concerns about a connection between nanoparticles from exhaust engines and air pollution, and lung cancers and heart disease. Ken Donaldson, of Queens' Medical Research Institute, Scotland, reported on his work on the asbestos-like properties of nanotubes. (July-August 2008) Ref.1564

European Nanotechnology Conference in Switzerland in September 2008
NanoEurope, a European exhibition for the transfer of nanotechnology knowledge, will be held in St.Gallen, Switzerland 16-17 September 2008. According to the announcement, it “will present successful commercial nanotechnology applications and introduce new scientific knowledge that can be commercialized”, and will also feature a business exposition. (July-August 2008) Ref.1565

The U.S. National Nanotechnology Coordination Office (NNCO) will hold a public meeting on January 4, 2007, to address the needs and priorities of environmental, health, and safety (EHS) research on engineered nanoscale materials. According to the announcement, the purpose of the meeting is to lay-out "strategic and interim goals for filling the EHS information needs gaps for nanomaterials." It will be structured around the following research areas: instrumentation, metrology, and analytical methods; nanomaterials and human health; nanomaterials and the environment; health and environmental surveillance; and risk management methods. (December 2006) Ref. 1566

A conference, Nanotechnology - Products and Processes for Environmental Benefit, is to be held in London on 16-17 May 2007 under the auspices of the Royal Society. More information will be available shortly. (December 2006) Ref. 1567

The 'Nanotechnologies - Safety for Success' conference, held 14-15 September in Espoo, Finland, has published its final report. The conference was attended by 180 specialists from 20 countries. According to the announcement, speakers introduced the audience to the opportunities, unknowns, and potential risks of evolving nanotechnologies, facilitated dynamic stakeholder discussion and identification of coordinated and concerted actions, and identified the key actions for efficient and well coordinated policies on nanotechnologies in Member States, in the European Union and internationally. (December 2006) Ref. 1568

'Nanotechnology for Security and Crime Prevention' 18 January 2007, The Royal Society, London, will examine a wide spectrum of new scientific developments taking place in the fight against crime, from anti-terrorism laser technology with the potential to revolutionize airport security to the latest research discoveries in nanoforensics.

“Health & Environmental Summit on Nano” will be held during Nanotech 2007, May 20-24, 2007 in Santa Clara, California, convened by the Nano Science and Technology Institute (NSTI) in collaboration with the U.S. Food and Drug Administration, to assist with the FDA’s fact-finding programs for Nanotechnology in Consumer Goods, including drugs, biologics, food and cosmetics. The 4th NanoSpain Workshop will be held in Seville, 12-15 March 2007, bringing together several hundred participants to discuss the latest developments in nanotechnology. (November 2006) Ref.1569

EU Conference on Nanotechnology Safety Policies
The current Finnish Presidency of the EU held a conference, Nanotechnologies - Safety for Success, in Otaniemi, Finland on 14-15 September 2006, with the goal of facilitating a dialogue on the opportunities and concerns presented by nanotechnologies. Another objective was the development of specific safety recommendations for the application of nanotechnologies. The conference was attended by 180 experts from 20 countries. The presentations, covering the key actions for efficient and well-coordinated policies, are available on the conference's Web site.

International Nanotech Conference to be Held in Egypt, March 2007
An international conference, NanoTech Insight 2007 will be held in Luxor, Egypt, 10-17 March 2007, to discuss the latest trends and discoveries in nanoscience. Topics will include scientific and technical developments, applications, and ethical and environmental impacts. (October 2006) Ref.1570

OECD Meeting on Manufactured Nanomaterials
The OECD will hold a meeting of the recently established Working Party on Manufactured Nanomaterials in London on 26-27 October 2006 to finalize recommendations for the 2006-2008 Programme of Work regarding human health and environmental safety aspects of manufactured nanomaterials in the chemical sector, to be forwarded to the Chemicals Committee of OECD. The meeting will discuss reports on recent developments in nanotechnologies and nanomaterials, their safety, and related activities in other International Organizations. For example, there will be discussions of taking over the Woodrow Wilson Center’s database and cooperating with other databases, such as the International Council for Nanotechnology (ICON)'s. (September 2006) Ref.1571

Electromagnetic Fields
- Warnings on Possible Wi-Fi Dangers
- Potential Magnetic Fields Regulations in Japan
- Study Says Mobile Phones Raise Tumor Risk
- Cell Phones damage rat brains
- Microwave Frequencies used for Environment-sensing are in Jeopardy

Warnings on Possible Wi-Fi Dangers
The expansion of wireless connections and use increases experts’ concerns and warnings on possible health effects of electronic smog. Recent research suggesting that use of mobile phones might increase brain tumor occurrence worsens concerns about the possible impact of the spreading Wi-Fi networks that expose people to electronic waves involuntarily. The spread of wireless connections might be dangerous mostly to the health of children and to the additional ~3% of population that the World Health Organization estimates are “electrosensitive.” Sir William Stewart—chairman of the UK Health Protection Agency and former chief scientific adviser to the UK Government—along with some European governments, school boards and parents, scientists, and doctors are calling for an official investigation of the risks that electronic waves might pose to human health and the environment. [See also Conviction in Transborder Electromagnetic Pollution Case, Study Says Mobile Phones Raise Tumor Risk, and Cell Phones Damage Rat Brains] (April 2007) Ref. 1573

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Potential Magnetic Fields Regulations in Japan
The Japanese Ministry of Economy, Trade and Industry plans to introduce regulations concerning magnetic fields around power-transmission cables and other electric facilities. Although the country has regulations on electric fields, per se, magnetic fields are not subject to any standards. A working group will be created in June under the Subcommittee on Electric Power Safety to conduct investigations on the link between electromagnetic fields and human health problems, and to advise the ministry. The initiative seems to be partly triggered by a study to be released soon by the World Health Organization on environmental health standards regarding electromagnetic fields. Along the same lines, the UK is finalizing a report that assumes a link between power lines and cancer, and that therefore recommends regulations for building around high-voltage power cables because of possible health risks. (April 2007) Ref. 1574

Study Says Mobile Phones Raise Tumor Risk
A study by the Swedish National Institute for Working Life has indicated that the use of mobile phones over a long period of time can raise the risk of brain tumors. The criterion for heavy use was 2000 hours or more, equivalent to ten years use at an hour a day. The work involved 2200 cancer patients and an equal number of controls. According to a Reuters dispatch, one of the scientists said that the results pointed to a 2.5× higher risk of a malignant tumor on the side of the head the phone is used. These results are at odds with earlier Dutch and British research, which found no such correlation. [See also Cell Phones Damage Rat Brains in February 2004 environmental security report.] (April 2006) Ref. 1575

Cell Phones damage rat brains
Although many studies over the past decade suggest that cell phone use may cause various adverse effects such as headaches and memory loss, no scientific consensus exists about the effect of long-term, low-level radiation on the brain and other organs. A comprehensive $12 million federal investigation of cell phone safety is currently under way but will take at least five years to complete. Meanwhile, researchers are attempting to replicate a recent Swedish study that showed significant blood vessel leakage, as well as areas of shrunken, damaged neurons in rat brains exposed to cell phone radiation. The higher the radiation exposure level, the more damage was apparent. International standards and agreements to limit radiation exposure from devices such as cell phones may emerge in response to future confirmations of these studies. (February 2004) Ref.1576

Microwave Frequencies used for Environment-sensing are in Jeopardy
Interference caused by increasing microwave activities from such applications as mobile phones, wireless computer communications, collision avoidance systems, and possible new military communications technologies are ruining the reliability of satellite data for weather forecasting and climate change. In a recent interview with the BBC, Dr Stephen English, manager of the Satellite Radiance Assimilation Group at the UK Met Office, called attention to the serious impact on climate change research of allowing various terrestrial radio services to use narrow bands in the microwave spectrum which are uniquely suited for making satellite-based meteorological observations that yield vital data for such research. He told the BBC, “Microwave observations are vital because they see through clouds—this is not possible in any other frequency band. We only need a few narrow-frequency bands for Earth remote-sensing, but most of these are unique, so there is no alternative. These bands are primarily used for temperature,
water vapor, sea ice, clouds (ice and liquid), and rainfall and snowfall estimation." According to the BBC, a meteorologists' working group on frequency management says protecting key regions of the microwave spectrum for passive remote-sensing is "a dramatic challenge", because of "the huge pressure of the commercial and military telecoms". (December 2004) Ref. 1577

**Underwater Sounds from Human Sources Endangering Marine Life**

Underwater Sounds from Human Sources Endangering Marine Life
A new report by the Natural Resources Defense Council (NRDC), *Sounding the Depths II: The Rising Toll of Sonar, Shipping and Industrial Ocean Noise on Marine Life*, is a comprehensive overview of the scientific record on the impact of man-made underwater noise on marine life. It shows that increasing human marine activity—industrial, commercial, and military—became life threatening to whales, dolphins, fish, and other marine species. The report reviews worldwide incidents of mass whale strandings related to military activities, and the oil and gas industry; maps the "hotspots" affected by different human activities; presents the latest scientific findings on noise and whale strandings; and suggests several measures for reducing the impacts of human-made ocean noise. The recommendations include geographic and seasonal restrictions on intense noise from military sonar and seismic air guns; better monitoring and marine life research; stronger international regulations and enforcement concerning marine life protection; and technological improvements to reduce sonic damage.


**Research Confirms Military and Industry Sonar Harms Whales**
The newly released report by the scientific committee of the International Whaling Commission (IWC) indicates that there is compelling evidence that sonar used by the military and the oil and gas industry harms whales. Scientists are unsure why sonar causes whale stranding, internal bleeding, and death. The use of low-frequency sonar is already limited by an agreement worked out between the US Navy and environmental groups whereby the Navy scales back its low-frequency sonar deployment from 75% of the world's oceans to approximately 1% of that area. Now the Natural Resources Defense Council (NRDC) is targeting the more common mid-frequency sonar.

The IWC report may reinforce the actions of U.S. animal welfare groups that threaten to sue the U.S. Navy over the use of mid-frequency sonar that harms whales. The groups sent a petition to the European Parliament that asks countries to immediately mitigate the effects of mid-frequency sonar. (July 2004) Ref. 1580

**The Debate over Use of Sonar by the Navy Continues; Legal Settlement Approved**
After a temporary restraining order issued July 3, blocking the use of high-intensity, mid-frequency sonar by the U.S. Navy during international Rim of the Pacific (RIMPAC) war games...
taking place in waters around Hawaii, on July 7, the judge has approved a settlement between the Navy and conservation groups, permitting the use of mid-frequency sonar during the eight-nation military exercises. The settlement agreement requires new safeguards, including a buffer zone, increased monitoring for marine mammals through underwater detection and aerial surveillance for marine mammals during sonar drills and the reporting of sightings to a marine mammal response officer. This type of sonar has been associated with mass strandings and deaths of whales, dolphins, and other marine species in U.S. waters and around the world. The conservation groups that filed the lawsuit were: Natural Resources Defense Council, the International Fund for Animal Welfare, the Cetacean Society International, the Ocean Futures Society (OFS), and (OFS) founder and director Jean-Michel Cousteau. [See also Underwater Sounds from Human Sources Endangering Marine Life in November 2005, Coalition Urges UN to Consider Legislation to Curb Harmful Ocean Sounds in June 2005, and other previous environmental security reports on the same issue.] (July 2006) Ref.1581

U.S. Supreme Court Rules in Favor of Navy in Sonar Case
On November 12th the U.S. Supreme Court ruled to lift restrictions on the Navy’s use of sonar off the coast of California, arguing that national security interests prevail over possible damages that such sonar might cause to whales and dolphins. [See also Sonar Restrictions Debate Continues in January 2008 and other previous environmental security reports on the same issue.] (November 2008) Ref. 1582

U.S. to Study Sonar Impact on Marine Mammals
The U.S. government approved a budget to research the effects of military sonar systems on whales and dolphins. Several scientists and environmental groups claim that underwater sonar to detect submarines interferes with the ecolocation system of whales and dolphins, sometimes causing mass strandings. The research will be conducted in Hawaii and will include studying the effects of military sonar systems on marine mammal hearing, as well as the development of electronic systems to detect the presence of marine mammals in naval training areas. The Hawaii research will provide an independent scientific view and reliable data on the effects of sonars on marine mammals and hopefully will elucidate the concerns. [See also The Debate over Use of Sonar by the Navy Continues; Legal Settlement Approved, Underwater Sounds from Human Sources Endangering Marine Life] (May 2007) Ref.1583

Sonar Restrictions Debate Continues
Earlier in January, a U.S. District Court judge in Los Angeles ordered clear rules for the U.S. Navy’s training with mid-frequency sonar off the coast of Southern California. The restrictions include: a minimum 12-nautical-mile no-sonar zone along the California coastline; shutdown of sonar when marine mammals are spotted within 2,200 yards; mandatory monitoring for marine mammals one hour prior to sonar exercises; and aerial surveillance prior to and during the exercise. However, later in the month, President Bush overruled the Court’s decision and signed an exemption for the Navy to use sonar in its training, then a federal judge temporarily lifted certain measures, and the Navy has resumed sonar training off the coast of Southern California. [See also U.S. to Study Sonar Impact on Marine Mammals in May 2007, and other previous environmental security reports on the same issue.] (January 2008) Ref.1584
International Convention for the Evaluation of New Technologies needed
ETC Group is collaborating with other partners to develop an International Convention for the Evaluation of New Technologies (ICENT), which it hopes to submit to the United Nations in 2004.

"Mulch ado about nothing? Or the Sand Witch?" Communiqué recently released by The Action Group on Erosion, Technology and Concentration (ETC group) expressed concern about the potential impacts that nanotechnology-based products might have on the environment and health, because these products are coming to market in the absence of government regulations and/or public discussion. ETC Group suggests that the public should be fully engaged in a discussion of the socio-economic, as well as health and environmental implications of nano-scale technologies and international regulations and standards concerning the use of nano-scale technologies are needed. To this end, ETC Group is collaborating with other partners to develop an International Convention for the Evaluation of New Technologies (ICENT), which it hopes to submit to the United Nations in 2004. (October 2003) Ref.1585

Publication of Data Dangerous to the Environment
A recent article by futurist and inventor Ray Kurzweil reminds us of the question of how to weigh the need for free interchange of the results of scientific research against the possibility that those results would offer a recipe for an environment-destroying terrorist attack. The particular example cited was the publication in the GenBank database of the full genome of the 1918 influenza virus. This information could theoretically lead to the reconstruction of the virus, and its possible release in weaponized form. The threat to the environment from this kind of information dissemination has received relatively little attention so far outside of the nuclear field, but is certain to become a major topic for international discussions. [See also Control of Pathogenic Chimeras and GMOs under Study in January 2004, Bioweapons Are Already Possible to Make, Says New CIA Report and New Lethal Viruses Developed in November 2003 environmental security reports]. (October 2005) Ref.1586

Toxicogenomic Technologies and Risk Assessment of Environmental Carcinogens: A Workshop Summary
This report is a summary of the workshop organized by the National Research Council’s Committee on How Toxicogenomics Could Inform Critical Issues in Carcinogenic Risk Assessment of Environmental Chemicals. Scientists, policymakers, and advisors participated in the workshop. They assessed how toxicogenomics could address critical knowledge gaps in risk assessments, including how toxicogenomic data could be applied to improve risk assessments, particularly cancer risk from environmental exposure to chemicals. After an overview of the types of data gaps that make regulatory risk assessment difficult, the workshop analyzed the types of toxicogenomics and their role in carcinogen risk assessment, and discussed the types of research that could move the field forward. (October 2005) Ref. 1587

Leading cancer specialists call for REACH strengthening
At a colloquium organized by the French Association for Research on Treatments Against Cancer at UNESCO Headquarters, a transatlantic group of leading cancer specialists presented scientific evidence on the necessity of strengthening the Registration, Evaluation and Authorization of Chemicals (REACH) policy, in order to better control carcinogenic chemicals. The participant experts stated that REACH was much weakened under the pressure of the
chemicals industry from both sides of the Atlantic. Corinne LePage, a French lawyer, wants to “advance the idea that polluting is a crime against humanity.” [See also items related to the REACH program] (May 2004) Ref.1588

GMO Issues

GMO Debate Continues
A preliminary ruling by the World Trade Organization established that the EU regulatory framework of GMOs is in non-concordance with its obligations under the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). The EU defends its legislation as being consistent with the internationally recommended approach and the requirements of the Cartagena Protocol on Biosafety. Several environmental groups consider the WTO ruling conflicting with the democratic principle of peoples’ right to know and decide, and, along with the EU, argue that the WTO is not the appropriate forum for this kind of decision.

Meantime, the biotechnology industry is pushing to abolish the Genetic Use Restriction Technologies (GURTs) (de facto moratorium on sterile seed technologies) at the next high-level meeting of the Convention on Biological Diversity (CBD) to be held in Curitiba, Brazil, March 20-31, 2006. Over 300 organizations worldwide campaign for a global ban on Terminator technology, asserting that sterile seeds threaten biodiversity and food sovereignty, and undermine the livelihood of the 1.4 billion people who depend on farm-saved seed.

A new report by experts of the European Commission's Joint Research Centre (JRC), New case studies on the coexistence of GM and non-GM crops in European agriculture, concludes that the unintended occurrence of GMO content threshold of 0.5% in harvested crops is safe for coexistence farming of crops like maize, cotton, and sugar beet before the grain has to be labeled as biotech. This is still under the EU’s 0.9% threshold for food and animal feed. Reducing the threshold under 0.5% would require extra farming measures like arranging seed plots as a function of dominant wind patterns, notes the report. [See also GMOs Controversy Continues in July 2005 and other related items on the same issue in previous environmental security reports.] (February 2006) Ref. 1590

Tougher Systems to Control GMO Suggested
GM Contamination Report 2005, by GeneWatch UK and Greenpeace International, warns that current practices and legal frameworks are not adequate to protect against GMO spread in unwanted places and to other plants. Reviewing cases of contamination and negative side effects of genetically modified organisms, the report reveals that over the past decade, GM crops have been planted illegally, or have pollinated non-GM food in 39 countries, which is nearly double the number of countries that introduced GM crops since 1996, when they were first commercialized. The report calls for an independent international commission to be set up to investigate, and for an international register of such incidents to be set up under the Cartagena Protocol on Biosafety. (March 2006) Ref. 1591

The Debate over Genetically Modified Organisms (GMOs) Continues
The EU is still divided over GMO bans. At the recent European Environment Council meeting, five European countries, Austria, France, Germany, Greece, and Luxembourg got majority
support for rejecting the European Commission’s proposal to lift the bans on transgenic varieties of maize and oilseed rape, under the justification that they present risks to human health and the environment. Meanwhile, Italy requested that the European Food Safety Authority (EFSA) conduct its own independent scientific research to assess possible health risks associated with GMO rather than rely on data provided by the biotech industry. [See also EU Commission Seeks to Increase Biotech Food Safety in January 2004 and The EU Ended its Ban on Genetically Modified Foods in May 2004 environmental security reports.] Japan, after finding a U.S. corn cargo infected with the unapproved Bt-10 biotech corn variety, decided to test every U.S. cargo entering the country. In China, genetically modified rice illegal cultivation and commercialization is spreading, increasing concerns that the non-approved variety could enter markets overseas. (June 2005) Ref. 1592

FAO calls for an international framework for GM trees
Genetic modification activities in forestry are taking place in some 35 countries and a commercial phase has already started without full scrutiny of potential benefits and risks. FAO says it is essential that environmental risk assessment studies be conducted with protocols and methodologies agreed upon at national and international levels. (July 2005) Ref. 1593

GM Crops Created Superweed
Scientists from the Centre for Ecology & Hydrology in the UK argue that there is a potential that modified genes from GM crops could transfer into local wild plants, creating herbicide-resistant "superweeds." The findings of their four-year study were recently made public. The phenomenon was observed in a trial where cross-fertilization between GM oilseed rape, brassica, and a distantly related plant, charlock, created a new form of charlock that didn’t react to lethal herbicide. The same was demonstrated in the lab for other weeds that became herbicide resistant. Although they consider that the potential of such cross-fertilization in the field is likely to be very low, they add that "this unusual occurrence merits further study in order to adequately assess any potential risk of gene transfer." [See also The Controversies over GMO Bans Continue in June 2005 and other previous environmental security reports.] (July 2005) Ref. 1594

The First Meeting of the Conference of the Parties to the Cartagena Protocol on Biosafety adopted procedures and mechanisms to implement and promote compliance with the Protocol aiming to protect biological diversity
The Cartagena Protocol on Biosafety to the Convention on Biological Diversity entered into force in September 2003. The first meeting of the Parties (COP MOP 1) held in Kuala Lumpur, 23-27 February 2004, adopted procedures and mechanisms to implement and promote compliance with the Protocol aiming to protect biological diversity from the potential risks that may be posed by living modified organisms (LMOs), commonly referred to as genetically modified organisms (GMOs). The delegates adopted documentation requirements and other procedures concerning labeling, handling, transport, packaging, and identification of LMOs. Some matters on which no agreement was reached will be considered at the next meeting, to be held in 2005. A negotiating group of experts will address the issue of liability and redress for damages resulting from transboundary movements of GMOs and develop a regime by 2008 (February 2004) Ref. 1595
The Millennium Project

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EU Commission Seeks to Increase Biotech Food Safety
The EU executive Commission adopted new legislation that requires each variety of genetically modified organisms used in food and animal feed to be assigned a unique code so products containing these GMOs can be accurately labeled and traced when they get on the market. (January 2004) Ref.1596

European Parliament enacts genetically modified food labeling rules
In a preamble to lifting the ban on GM food, the European Parliament passed regulations for the traceability and labeling of genetically modified (GM) food and feed products and sets the accidental mixing of GM in non-GM to no more than 0.9%. The new regulation also allows EU states to set ‘appropriate measures’ that protect conventional strains from cross-pollinating with GM crops. The new regulations are expected to come into force in September, with firms having six months to apply them. (January 2004) Ref.1597

The EU ended its ban on genetically modified foods
By authorizing the import of GM sweet corn, the EU ended its five-year ban on GM food. The Bt-11 maize imports are authorized for the next 10 years.
This first step might eventually ease the present restrictions of introducing GM food in the EU region. However, the rigorous labeling legislation [see European Parliament Enacts Genetically Modified Food Labeling Rules], applies. Also, as more than 70 percent of the European consumers oppose GM foods, it is not likely that lifting the ban on other GM food products will follow soon. (May 2004) Ref.1598

The Aarhus Convention and GMOs
The second meeting of the new Working Group on Genetically Modified Organisms under the Aarhus Convention concluded that a legally binding mechanism for public participation related to GMO activities in the framework of Aarhus Convention is needed. If developed, the legally binding options would be proposed to the next Conference of the Parties in 2005. (October 2003) Ref.1599

GM Food Protein Revealed to Cause Allergic Lung Damage in Mice
A study in Australia has revealed that subtle structural changes may occur when genetic modification is used to transfer a protein from one species to another. An anti-pest pea protein, coded for by a gene introduced from a bean, caused unexpected immune effects in mice. It turns out that when the transferred gene is expressed in the new organism, slight modifications may occur in the resultant protein, which is then different enough to trigger an immune response. Mice who ate the pea seed and then were exposed to the new protein developed skin reactions and mild lung tissue damage not seen on exposure to the original bean form of the chemical. [See also GMOs Controversy Continues in July 2005 and other related items on the same issue in previous environmental security reports.] (November 2005) Ref.1600

Chemicals could be the Cause of ‘Gulf Syndrome’
A new study by a federal panel of medical experts concluded that there is high probability that some ’91 Gulf War veterans suffer from inexplicable illnesses due to exposure to neurotoxins such as sarin, (from an Iraqi weapons depot blown up by American forces in 1991); pyridostigmine bromide (a drug given to troops to protect against nerve gas); and pesticides used
to protect soldiers in the region. This is a new view, inconsistent with previous panels’ conclusions. (October 2004) Ref.1601

**Japanese asbestos claims**
A recent ruling by the Japanese Supreme Court has derailed attempts by a number of Japanese citizens to sue for health impacts of working with asbestos at US military facilities. Under the current Status of Forces Agreement, suits are brought against the Japanese government, rather than against the United States. However, reimbursement can be sought by Japan, if Japanese courts rule in the plaintiffs’ favor. The Supreme Court ruling dismissed the claims made on the basis of a statute of limitations expiration. (April 2003) Ref.1602

**Phthalates May Trigger Lupus**
A new study at Indiana State University provides some evidence, in a mouse model, that phthalates may trigger lupus. In the study, only a certain strain of mice developed fatal cases of lupus after injection with a phthalate compound; much work remains to be done to clarify the possible connection. (December 2005) Ref. 1603

**Personal Computer Dust Health Implications**
A report by the Computer Take Back Campaign and the Clean Production Campaign blames brominated flame retardants used in computer casings and other electronics for a host of neurological and reproductive health problems. In order to avoid using materials with these flame retardants, some companies have begun replacing flammable materials with nontoxic flame-resistant materials. The European Union has already banned the use of some of these chemicals in electronic products by 2006, and several states in the US have taken legislative steps to do so as well. (June 2004) Ref.1604

**Pollution**

**Greenhouse Gas on the Rise**
At the same time, methane—22 times more powerful than CO2 for global warming—is emitted as result of melting permafrost at a rate five times faster than thought, and could become a significant factor in global warming, representing a “a climate time bomb,” warn scientists. Most of the methane-releasing permafrost is in Siberia. Another study reveals that carbon trapped in this type of permafrost could be 100 times the amount of carbon released into the air each year by the burning of fossil fuels. Deep ice drilled out of Antarctica confirms that carbon dioxide levels are substantially higher now than at any time in the last 800,000 years. (September 2006) Ref.1606

**China to Pass U.S. in CO2 Emissions this Year Making U.S. and China Target for Changing Climate Change Policies**
A strategic focus on just the U.S. and China is the most efficient use of environmental lobbying power, said Dr. Jessica Matthews, President, Carnegie Endowment for International Peace, at a recent session at the Woodrow Wilson International Center for Scholars’ Environment and Security Program. The magnitude of changes necessary to affect the growth of greenhouse gas emissions will require the leadership of the top two emitters. Without them, she argued, the
changes in other countries are of insufficient significance. China may pass the U.S. in annual CO2 emissions before the end of 2007. (March 2007) Ref.1607

**Polluted Skies and Global Warming Puzzle Decoded**
A team of U.S. and Israeli scientists seem to have found the link between global warming and cloud formation. The pattern they identified shows that light-reflecting pollution favors cloud formation, while light-absorbing aerosols impede it by warming the air, which impedes moisture condensation. This finding helps better understand and predict climate change, as well as the role of different kinds of pollution in cloud formation and rain activity. (July 2006) Ref.1608

**Ozone Hole Worst Ever Recorded**
In addition to pollution, climate change is increasingly recognized as a cause for upper atmosphere ozone depletion. A new UN report revealing continuous ozone depletion, notes that this year’s Antarctic ozone hole covered 29.5 million square kilometers and the ozone mass deficit was 40 million tonnes (European space Agency, ESA, measurements on October 2), the largest ever recorded. The assessment is based on a compilation of data provided by NASA and the ESA, and observations by the WMO Global Atmosphere Watch (GAW) ozone network. Scientists warn that the trend might continue for the next two decades unless measures are taken to curb climate change and diminish levels of ozone destroying substances in the atmosphere, and countries generally adhere to and enforce the Montreal Protocol and Vienna Convention on phasing out of ozone-destroying chemicals. At a Montreal Protocol meeting, held in New Delhi, October 28-November 3, UNEP will be presenting a 10-year road map for governments to follow in protecting the ozone layer. (October 2006) Ref.1609

**New Predictions for the Atmosphere by 2030**
Research funded by the EU network ACCENT assessed the state of the global atmospheric environment and evaluated the likely changes by 2030 in conjunction with current regulations. It presents three scenarios: Current Legislation Scenario—based on current air quality legislation; the Maximum technically Feasible Reduction scenario—based on implementation of technological breakthroughs to achieve maximum emissions reduction; and the Intergovernmental Panel on Climate Change (SRES-A2) scenario--- a relatively pessimistic approach is shown in contrast to the two more optimistic scenarios. The results suggest that current international legislation on air pollutant emissions is not adequate to reduce ozone and ecosystem damage (mainly caused by elevated nitrogen pollution.) (October 2006) Ref.1610

**Burning Fossil Fuels Acidifies Oceans, Erodes Coral Reefs**
Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers, a report co-authored by scientists from Australia, Canada, France, Germany, Japan, Monaco, New Caledonia, and the United States, is a comprehensive analysis of marine calcifiers, documenting that worldwide emissions of carbon dioxide from fossil fuel burning is making the oceans more acidic, dramatically altering ocean chemistry and threatening marine biodiversity, mainly causing coral decalcification. Although recommending further research for determining the extent of the impacts, it predicts that calcification rates might decrease as much as 60% within the 21st century. (July 2006) Ref.1611

**New Research Finds Human Energy Usage is a Long-Term Heating Problem Independent**
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of Greenhouse Gases and Solar Radiation
In addition to greenhouse gases and rises in solar radiation, the planet could continue to be warmed by the increasing number of people who are using ever larger amounts of energy that add heat from their use (combustion engines, nuclear reactors, etc.). In a briefing by Professor Eric Chaisson of Tufts University to the Foundation for the Future this month [March 2007], he demonstrated that human energy use will continue to warm the planet: 1) If global non-renewable energy use continues increasing at its current rate of ~2% annually and nothing else changes, then a 3 degree Celsius rise will occur in ~8 doubling times, or ~280 years (or ~350 years for a 10 degree Celsius rise); and 2) More realistically, if world population plateaus at 10 billion inhabitants by 2100, developed (OECD) countries increase non-renewable energy use at 1% annually, and developing (non-OECD) countries do so at ~5% annually until east-west energy equity is achieved in mid-22nd century after which they too continue generating more energy at 1% annually, then a 3 degree Celsius rise will occur in ~300 years, or 10 degrees Celsius in ~450 years. Hence, it is necessary to find energy sources, such as geothermal, tidal, wind, and photovoltaics that, unlike fossil or nuclear sources, do not add heat as they convert energy for human usage. (March 2007) Ref.1612

Pollutants Travel Globally
Researchers have begun studying whether gases from the United States are responsible for pollution in Europe. Specific emphasis is being placed on the transport of pollutants contributing to ozone depletion. [See also item Space Technology use for Environmental Security in this subchapter.] (July 2004)
A new and larger study by the International Consortium for Atmospheric Research on Transport and Transformation, or ICARTT, an air quality study billed as the largest and most comprehensive yet done, reveals that pollutants from Asia, in particular China, are reaching the East Coast of North America and are presumably continuing eastward toward Europe and Africa. (August 2004) Ref.1613

Health Impacts of Fuels
According to a new study published in the International Journal of Cancer, the risk of ovarian cancer increases with increased exposure to diesel exhaust. Likewise, exposure to gasoline engine exhaust also was found to increase the risk of ovarian cancer. However, the study’s findings contradict those of previous studies linking other types of cancers to engine exhausts. Meanwhile, a study in Occupational and Environmental Medicine showed that living near a fuel station might quadruple the risk of acute leukemia in children. (August 2004) Ref.1614

Safe Toxin Levels Unknown
A recent paper in the journal Public Library of Science - Medicine reported that a review of the epidemiological data shows that there is no clearly safe level of exposure to four of the most common environmental toxins - lead, radon, tobacco smoke and such byproducts of drinking-water disinfection as the trihalomethanes. The general practice has been "to assume that there is no safe level of exposure to carcinogens and use linear dose-response models to estimate human health risks at low exposure levels … [but] that a threshold, or 'safe', exposure level exists for noncancerous." If further work confirms the conclusion of this study that the non-carcinogen part of that assumption is incorrect, there may be substantial changes in the international regulatory approach to environmental pollutants. [See also EU and Japan Respond to Risks from...
Drug Metabolites Identified in Wastewater—Removal Possible
University of Buffalo researchers announced (Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy in Orlando, FL, March 16, 2006) that metabolites of two antibiotics and a medical imaging agent have been found in wastewater treatment plants. "Current wastewater treatment processes are optimized to reduce nitrates and phosphates and dissolved organic carbon, the major pollutants of concern in domestic wastes," said Diana Aga, UB's research leader, "However, treatment facilities don't monitor or measure organic microcontaminants like residues of pharmaceuticals and active ingredients of personal care products." The team described methods for identification and treatment of these pollutants. Such antibiotics and their metabolites can increase drug resistance among disease organisms and synthetic hormones can act as endocrine disruptors. Italian researchers also found high concentrations of pharmaceuticals in aquatic environments at levels close to those that may induce adverse ecotoxicological effects. (March 2006) Ref.1616

Microplastics Recognized as Environmental Threat to Oceans
A note has been published on the results of a conference held last month to discuss the increasing threat to the maritime environment posed by plastic “microparticles” (< 5 mm). A report quoted a speakers as stating that, “as plastic items break down, any toxic additives they contain—including flame retardants, antimicrobials, and plasticizers—may be released into the ocean environment”, “plastics can act like sponges to collect hydrophobic persistent organic pollutants, such as PCBs”, and “microplastics can impact marine food chains”. (November 2008) Ref. 1617

Dechlorane Plus® Detected in Atmosphere
An atmospheric monitoring network in the U.S. Great Lakes region has detected the presence of Dechlorane Plus, an organochlorine flame retardant, the limited preliminary data for which indicates that it is persistent, bioaccumulative, and potentially toxic. This is the first report of the presence in the environment of this widely used chemical. Major uses of Dechlorane Plus are in electrical wires and cables and in computer connectors. Some of its properties may be similar to those of the polybrominated diphenyl ether (PBDE) compounds already banned in Europe and in some parts of the U.S. (January 2006) Ref.1618

Accelerating Environmental Health Crises in China
Tens of millions in southwest China suffer because of coal plants. The Yellow River, a water source for 140 million people, is drying up, due to agricultural and industrial demands, falling water tables, and changes in glacial and snow-cap melting patterns. On November 20, Beijing’s air quality was rated as ‘hazardous’ and residents were warned to stay indoors. While per capita emissions remain low compared to developed nations, the growing impact of China on climate change, along with severe intra-country air pollution, is of increasing concern to environmentalists and policy makers. The World Energy Outlook 2006 reports that China will surpass the U.S. in 2009 as the biggest emitter of carbon dioxide. This is nearly a decade ahead of previous predictions. [See also China Creates 11 Independent Environmental “Watchdog” Centers in July 2006, China’s President Hu Ordered Environmental Regulations for Military
Activities in April 2006, and other related items in previous environmental security reports.\[ (November 2006) Ref.1619

Repeated Spills in China Threaten Human Health and the Environment
After last November’s catastrophic slick of several toxic chemicals into the Songhua River following an explosion at a petrochemical plant in China's northern Jilin Province, several new major toxic spills have threatened the environment and health of millions of Chinese in other parts of the country. One spill of diesel oil into the Yellow River forced the shutdown of 63 pumping stations cutting off the water supply to six million inhabitants of the Shangdong capital city of Jinan. A cadmium spill in southern China's Guangdong province cut tap water supply to tens of thousands of people for more than a week in December, and another cadmium spill that occurred recently in Hunan was neutralized faster with less implication for the population. A field mission report by UNEP following the Songhua River spill makes several recommendations to the Chinese authorities for overcoming and coping with such incidents, including considering the implementation of a program such as UNEP’s Awareness and Preparedness for Emergencies at Local Level (APELL). The report also highlights that the environmental and health implications of the spill can’t be completely assessed yet. (January 2006) Ref.1620

North American Report on Children's Health and Environment Indicators
*Children’s Health and the Environment in North America* is the first ever report analyzing the link between children's health and environmental quality. The report considers 13 indicators under three thematic areas: asthma and respiratory disease; effects of exposure to lead and other toxic substances; and waterborne diseases, finding that only one of the indicators, addressing asthma, was fully reported by all three countries, Canada, Mexico and the U.S. Highlighting that children are at higher risk by exposure to environmental pollution than are adults, the report recommends better data collection and reporting, for improving public policy in this area. The report is the result of a joint effort of The Commission for Environmental Cooperation, the International Joint Commission, the Pan American Health Organization, the World Health Organization (WHO), and the governments of Canada, Mexico and the United States. (January 2006) Ref.1621

China’s ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution
The January 11, 2007 Chinese anti-satellite (ASAT) test created tens of thousands of new pieces of space debris in low-earth orbit (LEO) with size greater than 1 cm—large enough to cause significant damage to a satellite they might hit. So far about 900 pieces greater than 5-10 cm have been cataloged as being created by the Chinese test. Even without the Chinese test, a NASA model shows that some heavily used parts of LEO already have such a high density of debris that collisions of objects at these altitudes will increase the number of debris fragments by 200% in two hundred years. The January additions make this situation worse, and multiple future tests or uses of such ASATs—especially against much larger satellites—could greatly increase the threat to satellites, the Space Station, space shuttles and other space craft as they travel through this polluted space. At high altitudes, where the atmosphere is very thin, this debris can stay in orbit for centuries, and so far there is no effective way to remove it. This is likely to steadily increase space insurance costs and without major changes could eventually seriously limit access to space. This shows that one actor can affect future access to space for all. Currently 41 nations own satellites. Since there is no mechanism to address this pollution event, some kind of anti-
ASAT debris creating treaty seems inevitable, possibly drafted by the Inter-Agency Space Debris Coordination Committee in Vienna. (February 2007) Ref. 1622

**Other Environment-Related Protection Measures**

It is estimated that the rate of loss of biodiversity is now the highest in human history. More regional balance among Parties to the biological diversity conventions and more efforts in capacity-building for competent national authorities are essential to reverse the present biodiversity loss trend. UNEP in cooperation with the convention secretariats is assisting more than 120 countries to develop and implement national biodiversity strategies and action plans.

**Desertification Synthesis (Millennium Ecosystem Assessment 3)**

The *Desertification Synthesis* report was launched on June 17, to mark World Day to Combat Desertification. It represents a synthesis and integration of the findings of the assessment of ecosystem change—mainly desertification—due to human activity, as well as the consequences of these changes on future human wellbeing. It provides scientific evidence for sustainable living policies. “Growing desertification worldwide threatens to swell by millions the number of poor forced to seek new homes and livelihoods,” according to the report. The *Desertification Synthesis* is part of a series of six MA synthesis reports. [See also items 9.1 Biodiversity Synthesis Report (Millennium Ecosystem Assessment 2) of May and 8.7 Human Footprint on Earth Ecosystem at Critical Stage and Millennium Ecosystem Assessment Synthesis Report of March 2005 environmental security monthly reports.] (June 2005) Ref.1624

**Ecosystems & Human Well-being: Wetlands & Water Synthesis**

*Ecosystems & Human Well-being: Wetlands & Water Synthesis*, the fifth synthesis report by the Millennium Ecosystem Assessment (MEA), was launched at the opening ceremony of COP9 of the Ramsar Convention on Wetlands. The report assesses the current situation of wetlands in view of strengthening the link between scientific knowledge and decision-making for the conservation and wise use of wetlands, and setting future agendas for Ramsar. The report found that the degradation and loss of wetlands, as well as the status of both freshwater and coastal wetland species is deteriorating faster than those of other ecosystems. (December 2006) Ref. 1625

**Ecosystems and Human Well-being: Health Synthesis**

*Ecosystems and Human Well-being: Health Synthesis*, a report by WHO, is the sixth (last) in the series of the Millennium Ecosystem Assessment reports. Examining the complex interdependence between the ecosystems and human health, the report assesses the current state of affaires, as well as the critical factors that might trigger future changes in ecosystems and the possible health implications. Pointing out the benefits reached over the past 50 years in adapting the natural ecosystems to benefit the human condition, the report notes that not all regions and groups of people have benefited equally from this process. Continued ecosystem degradation, with already serious consequences to human health, could grow worse over the next 50 years. Regions facing the greatest risks include sub-Saharan Africa, Central Asia, parts of Latin America, and certain areas in South and Southeast Asia, points out the report. [See also *Millennium Ecosystem Assessment Synthesis Report in March 2005, Biodiversity Synthesis*]
Report (MA report 2) in May, Desertification Synthesis (MA report 3) in June, and Environmental concerns increase opportunities and challenges for business (MA report 4) in July environmental security monthly reports.

Note: The Millennium Ecosystem Assessment (MEA) won the 2005 Zayed International Prize for the Environment, awarded for 'scientific and or technological achievement in environment'.

(December 2006) Ref. 1626

New International Financial Alliance to Support Biodiversity

Representatives of 191 Parties to the Convention on Biological Diversity and over 100 ministers met in Bonn to improve the set of rules that help protect biodiversity. Plant and animal species are being lost at a rate between 100 and 1000 times the natural extinction rates. One of the results of the meeting was the establishment of Life Web as a financing mechanism for protected areas. So far, more than 60 Parties have made financial pledges. For example, German Chancellor Angela Merkel pledged 500 million Euros for forest protection up to 2012 and 500 million Euros a year after that. (Mat 2008) Ref.1627

European environment - State and outlooks 2005

The European environment - State and outlooks 2005 report by the European Environment Agency (EEA) analyzes the European ecological footprint. Revealing that it takes 2.1 times the biological capacity of Europe to support Europe, the authors emphasize that Europe should reassess its consuming patterns and consider new policies that would take into account the disproportionate impact European present behavior has on the rest of the world's environment. With rich graphs and data, the report shows a comprehensive regional analysis as well as detailed analysis by country and sectors over time. For example, while in 1961, Europeans represented over 12% of global population with a demand on global ecological capacity of less than 10%, by 2002, Europe's population represented only 7% of the world total but its demand on global ecological capacity increased to nearly 20%. The report outlines some economic, technological, and policy strategies for addressing Europeans’ ecological footprints without jeopardizing their quality of life. More detailed sub-reports on specific sectors and policies are to come next year. (December 2006) Ref. 1628

Europe 2005: The Ecological Footprint

Europe 2005: The Ecological Footprint is a report launched at the European Parliament, by WWF and Global Footprint Network, analyzing the impact of Europe’s lifestyle on the ecosystem. It reveals that Europe’s ecological footprint is 2.2 times larger than its own biological capacity. With just 7% of world population, Europe consumes 17% of the world resources supply—a figure that has risen nearly 70% since 1961. The report shows that innovation and addressing ecological deficits are fundamental to maintaining Europe’s competitiveness and wellbeing. Europe 2005: The Ecological Footprint is based on Global Footprint Network's National Footprint Accounts and analysis (specifically France, Germany, Greece, Poland, and the UK), as well as a comparison of the footprints of 25 European nations. [See also items 9.1 Biodiversity Synthesis Report (Millennium Ecosystem Assessment 2) of May and 8.7 Human Footprint on Earth Ecosystem at Critical Stage and Millennium Ecosystem Assessment Synthesis Report of March 2005 environmental security monthly reports.] (June 2005.) Ref.1629
**Mediterranean Threatened by Development Pressures, Says Blue Plan Report**

_A Sustainable Future for the Mediterranean: the Blue Plan’s Environment & Development Outlook_, a report by the UNEP’s Mediterranean Action Plan, states that if current trends continue, the region’s ecosystem will be severely jeopardized by 2025. The report suggests an alternative based on the principles of sustainable development that could boost the quality of life over the coming decades while protecting the environment. The report was commissioned by the 21 nations bordering the Mediterranean Sea and is the result of the cooperation of 300 experts. (April 2006) Ref.1630

**Europe to Redouble Efforts to Stabilize Biodiversity by 2010**

At the fourth Intergovernmental "Biodiversity in Europe" Conference, held February 22–24 at Lake Plitvice National Park, Croatia, officials from 40 European governments and 32 environmental organizations agreed to redouble their efforts to achieve the goal of halting Europe’s biological diversity decline by 2010. Climate change, human activities, and low political priority of biodiversity were noted as the main factors that should be addressed to curb present trends. The benefits of the development of the Pan European Ecological Network and the initiatives of several banks to establish European biodiversity investment funds were stressed. The conclusions of the Conference will be advanced at next month’s meeting of the Convention on Biological Diversity. (February 2006) Ref.1631

**World’s Largest Environmental Forum to Set Priorities**

About 3000 environmental leaders in government, business, NGOs, universities, and international organizations attended the 3rd IUCN World Conservation Congress in November 2004 in Thailand. It would address the issue of natural resource conservation relative to economic and population growth. The Congress is proposed to have three elements: IUCN Commission Meetings, the World Conservation Forum, and the Members Business Assembly. The Commission meetings would set the priorities for conservation work for the coming four years, addressing species extinction, management of protected areas, laws to conserve nature, ensuring that fair benefits flow to rural people from natural resources, building understanding of how ecosystems function, and improving public understanding of conservation. The World Conservation Forum would discuss and define solutions for problems such as the loss of species and ecosystems, globalization and related health concerns, poverty alleviation, and economic and legal steps to ensure the sustainable use of natural resources. (May 2004) Ref.1632

**The Little Green Data Book, 2005**

"The Little Green Data Book 2005," a joint product of the World Bank's Development Data Group and Environment Department is a quick reference on key environmental data for over 200 countries (one country per page). It presents 47 environment indicators and data, structured under the headings of agriculture, forests, biodiversity, energy, emissions and pollution, water and sanitation, and 'greener' national accounts. Unfortunately the current book’s data are only through 2003; nevertheless, it helps the reader get the big picture in a small resource. It can be ordered by sending an email to eadvisor@worldbank.org or it can be downloaded at: http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/TheLittleGreenDayaBook2005/$FILE/2005Littlegreendatabook.pdf (April 2005) Ref. 1633
New Zealand’s Largest Environmental Management Forum
The Environmental Institute of Australia and New Zealand (EIANZ) will hold its annual Environmental Conference in Christchurch, New Zealand, 29 March – 1 April 2005. This will be the largest Australasian environmental management event to be held in New Zealand; more than 300 specialists are expected to attend. According to the conference announcement, concurrent sessions will explore case studies in resource management, environmental management systems; integrated planning and systems-thinking; environmental assessment and reporting; and communication and environmental education. Field trips and technical tours will include the Living Streams restoration program, a Maori perspective of resource management at Te Waihora/Lake Ellesmere; the Kowhai Organic Farm at Lincoln University and ecosystem protection in Canterbury’s braided rivers. The meeting is designed to be environment-friendly; delegates can make their travel carbon-neutral by paying a CO2 carbon offset charge ranging from $3 to $26. These funds will be used for regeneration of native forest. (December 2004) Ref. 1634

Brazil launches Project Drake to counter biopiracy
Biopiracy, or the harvesting / removal of genetic material without payment or royalties, is increasing as genetic engineering technologies continue to develop new medicines and other genetically derived products. In response to this economic loss, the Brazilian federal police have launched Project Drake, a program to monitor aerial and seaports as well as to increase awareness of the problem. Currently, US foreign policy recognizes genetic Intellectual Property Rights (IPR) under the 1994 Uruguay Round of GATT trade negotiations. Through IPR, genetic material can be traded, in exchange for “socially valuable innovations” that arise from it. Furthermore, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) facilitates multinational markets’ use of genetic resources. (August-September 2003) Ref.1635

Experts Call For Global Network to Prevent Asteroid Disasters
The report Asteroid Threats: A Call for Global Response by the Association of Space Explorers presented for consideration by the UN calls for an international contingency plan to counter threats from Near Earth Objects (NEO), such as an asteroid impact on the Earth. It points out that although a possible collision is predictable up to 15 years in advance, developing the technology needed to divert an incoming asteroid may require international cooperation. The UN Committee on the Peaceful Uses of Outer Space will debate the report at its 2009 session to be held in June 2009. (November 2008) Ref. 1636

NEW ORGANIZATIONS WITH MANDATES WITH EVENTUAL ENVIRONMENTAL SECURITY IMPLICATIONS

Global Facility for Disaster Reduction and Recovery to Mitigate Impact of Natural Disasters
The Global Facility for Disaster Reduction and Recovery, set up by the UN International Strategy for Disaster Reduction in cooperation with the World Bank, is a new initiative aiming to improve preparatory and recovery actions to lower the risks and consequences of natural disasters. The Facility will mainly ensure that disaster risk reduction is considered a priority in development projects in countries at risk, and will provide expertise and technical assistance for including risk reduction in strategic planning. The World Bank Global Hotspots Study identifies
86 vulnerable countries with risks of high mortality and economic loss. [See also *ICSU Launched Global Disaster Research Program* in October 2005, and *New Developments for Addressing Natural Disasters* in July 2005 environmental security reports.] (October 2006) Ref.1638

**FAO Launched New Crisis Management Centre**
In collaboration with the World Organisation for Animal Health, the UN Food and Agriculture Organization launched a new Crisis Management Centre to fight avian influenza outbreaks and other major animal health or food health-related emergencies. The center continuously monitors disease information around the globe and is able to respond in less then 48 hours, when a suspected outbreak is reported. [See also *Bird Flu Spreads Increasing Threats of a Human Pandemic* in February 2006 and other previous environmental security reports on this issue.] (October 2006) Ref1639

**WHO-sponsored pandemic flu task force holds first meeting in Geneva**
The Ad Hoc Influenza Pandemic Task Force held its first meeting to discuss best actions in case of an outbreak. The Task Force is providing independent risk assessments and advising WHO on possible measures to be taken. These could include rapid containment effort, warning governments of risks and accelerating vaccine production. The Task Force includes 21 experts and will function until June 15, 2007, when WHO's revised International Health Regulations come into effect. (October 2006) Ref.1640

**UN Creates Secretariat of the Global Bioenergy Partnership at FAO**
The recently inaugurated Secretariat of the Global Bioenergy Partnership (GBEP) will help UN efforts to promote “green” fuels by facilitating a global political forum to support bioenergy production, marketing and use, and assisting international exchanges of know-how and technology. The focus will be mainly on helping developing countries’ governments and institutions formulate sustainable bio-energy policies and strategies to help reduce dependency on fossil fuel, as well as encouraging investments in multilateral projects for bio-energy development. It will also assist in formulating guidelines for measuring greenhouse gas emission reductions due to the use of bio-fuels. The GBEP Secretariat is located at the UN Food and Agriculture Organization headquarters in Rome and is supported by the Italian Ministry for the Environment, Land and Sea. [See also *UN Commission on Sustainable Development Fosters Energy Security* in May 2006 environmental security report.] (September 2006) Ref.1641

**‘3R’—Reduce, Reuse and Recycle New Environmental Think Tank for Asia**
The ‘3R’—Reduce, Reuse and Recycle—is a new initiative launched by the Asian Development Bank, Asian Institute of Technology, UNEP, and the UN Economic and Social Commission for Asia and the Pacific (UNESCAP) to promote sustainable use of natural resources and increase environmental efficiency. The center will be located at the Asian Institute of Technology in Bangkok. It will function as a think tank on environmental technology, knowledge dissemination, research capacity building, regulations, and policy related to 3R practices in cooperation with other related Asian initiatives. (August 2006) Ref.1642

**Asian Consortium on Non-traditional Security Issues**
The Consortium of Non-traditional Security Studies in Asia (NTS-Asia) is made up of 14
research institutes and think tanks from Asia that will study issues including efforts to tackle pandemics, environmental degradation, and cooperation during disasters resulting from climate changes. Climate change, the avian flu, and other “invisible, diverse, and unpredictable” threats are becoming a top security concern in many Asian countries. The consortium will be hosted by Singapore and plans to hold annual conferences on non-traditional security issues with peer institutes from the U.S. and Europe. (January 2007) Ref.1643

**UN StEP Initiative for Reducing E-Waste**

Solving the E-waste Problem (StEP) is a global public-private initiative coordinated by the United Nations University with the overall aim of improving e-waste management by creating global standards for e-scrap and recycling. The partnership includes various UN organizations, major high-tech manufacturers, and governmental, NGO and academic institutions, along with recycling/refurbishing companies. Five task forces will help shape new e-waste standards: Policy & legislation (assessment of current e-waste policies and recommendations for future strategies); ReDesign (improve electronics design for better reuse, repair, refurbishment and recycling); ReUse (development of a global reuse system to minimize environmental impacts) ReCycle (develop sustainable e-waste recycling systems); and Capacity building (globally accessible documentation on e-waste). The initiative was officially launched on March 7. [See also UN E-Waste Forum and Basel Convention’s Conference of Parties, Toxic Waste Disposal of Global Growing Concern in September 2006, WEEE Comes into Effect, and other related items.] (March 2007) Ref. 1644

**World's First Academy of Environmental Law opened by International Union for the Conservation of Nature (IUCN) is a global network to promote environmental legal education and advanced environmental law research**

The Academy of Environmental Law opened by International Union for the Conservation of Nature (IUCN) in China, November 4, is a global network of university law departments and will function as a forum to promote environmental legal education and advanced environmental law research, and convene annual colloquiums in different parts of the world. (November 2003) Ref.1645

**UN to Enhance Eco-Development Procedures**

UNESCO and Italy began the procedure for establishing the Institute on a Partnership for Environmental Development (IPED) to provide capacity building to help expedite economic development while protecting the environment in developing countries. It will operate mostly by helping to set environmental targets for the UN's priority development projects, and providing necessary knowledge and training to developing countries on how to effectively integrate environmental dimensions into economic development. IPED will be located in Trieste, Italy. *A legal framework for the integration of environmental, social and governance issues into institutional investment*, a report just released by UNEP, addresses the issue of eventual “legal obligation” of institutional investors to consider environmental, social, and governance issues when choosing how to invest their resources. [See also *Efforts for Increasing Corporate Eco-responsibility* in July 2004 environmental security report.] (October 2005) Ref.1646

**Interpol Creates Global Information Center to Combat Bioterror Threat**

At a recent Interpol conference, police and health specialists decided to create a global
information center to fight the threat of bioterrorism and asked for greater cooperation between law enforcement and health organizations. The health sector representatives called for an alert system that would allow quick response in case of an epidemic—whether of natural origin or from a bioterrorism source. Three training workshops are scheduled: the first in South Africa at the end of this year, the next two in 2006 in Chile and China. The information center on bioterrorism will be located at the Lyon Interpol headquarters and be available to all 182 members of the organization. (March 2005) Ref.1647

Carpathian Mountain office of the United Nations Environment Programme
The United Nations Environment Programme (UNEP) has opened a new office at the Vienna International Centre, which will act as the Interim Secretariat of the Framework Convention on the Protection and Sustainable Development of the Carpathians. The office will also promote environmental cooperation in Central and Southeastern Europe. Four of the Convention’s signatories (the Czech Republic, Hungary, Poland and Slovakia) have requested the European Commission to adhere to the Convention and support its implementation. (July 2004) Ref.1648

Russian Green Party Formally Organized
The Green Russia party (now its official name) has now been formally organized with Alexei Yablokov as its chairman and Alexander Nikitin, the former naval officer, and nuclear safety activist, as one of its principal figures. The party's major present goal is to achieve the 50,000 member level necessary for participation in elections. [See also Russia's Green Movement Plans to Become a Political Party of October, 2004 environmental security monthly report] (June 2005) Ref. 1649

Russia’s Green Movement Plans to Become a Political Party
The Green movement finally made a public appearance in Russia, with a press conference on 15 October, led by Alexei Yablokov. A major figure in their campaign to become a recognized political party is Alexander Nikitin, the former naval officer who was acquitted of espionage for revealing pollution hazards in Russia's submarine program. Yablokov claims that 50-60% of the population is concerned about a healthy environment and would support a trusted green party. It is unclear if this group can overcome the substantial bureaucratic obstacles to forming a new party to participate in the 2007 parliamentary election, but their efforts are certain to bring the environment much more strongly into the forum of public discussion in the country. (October 2004) Ref. 1650

China Climate Change Organization Formed
China National Council of International Human Dimensions Programme on Global Environmental Change (CNC-IHDP) was launched by Chinese scientists and humanities researchers to increase Chinese involvement in international discussions on the impact of global climate change. The new organization run by the Chinese Academy of Sciences will coordinate the efforts of researchers in all fields to promote China's research on global climate and environmental changes, and to investigate the relationship between those changes and sustainable development, globalization and human safety, and global land change and urbanization. (September 2004) Ref. 1651
Liberia's First Environment Center Opened
The UNHCR has opened an environmental protection agency in Liberia to ensure that the repatriation of thousands of refugees will not have a negative impact on the environment already devastated by 14 years of war. The agency will educate the repatriates on how to use and revive the environment as they resume their daily activities. (March 2005) Ref.1652

European Green Diplomacy Network
The EU recently announced an initiative to enhance its capacity to negotiate effectively on environmental issues. The "Network of Diplomats and Experts on European Diplomacy on Environment and Sustainable Development" was established some months ago, and will draw on existing diplomatic resources in the new, enlarged, 25-member EU. The Network has identified efforts to encourage Russia to ratify the Kyoto Protocol as a first activity. Other targets include effective negotiations at a meeting of the UN Convention on Biological Diversity (CBD) in February 2004, and efforts to promote renewable energy and marine environmental protection. In terms of methods, the Network will gather intelligence on the positions of other actors, and will play an active role through, among other things, setting up campaigns to get the EU message out across the world. The initiative will seek to redress the problem of EU negotiators spending much of their time in internal processes, thereby moving toward a more proactive -- rather than reactive -- approach in their negotiating tactics. (November 2003) Ref.1653

European Chemicals Agency created under the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program
On 31 October 2003, the European Commission submitted to the European Parliament a proposal for the establishment of the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program. On 3 December 2003, the President of the European Parliament announced that he had referred the proposal to the Committee on the Environment, Public Health and Consumer Policy. One of the most important elements in the proposed regulation is the establishment of a European Chemicals Agency. On 12 December 2003, at the Brussels European Council, a political agreement was reached on the location of this European Chemicals Agency, which will have its seat in Finland. Under the REACH system, EU Member States will maintain a system of official control, but the European Commission itself will establish guidelines for the enforcement of the REACH program. [See also the issues on the REACH program]. (January 2004) Ref.1654

European Space Policy Institute founded
The European Space Policy Institute (ESPI), founded in Vienna at the initiative and with the support of the European Space Agency (ESA) and the Austrian Space Agency (ASA), is intended to become the focal point for promoting European space policy in the world. It creates a network of think tanks that will cooperate in know-how and join forces in order to conduct comprehensive space policy research. Any organization or legal person with a particular interest in taking part in ESPI activities may become a member of the Institute. (November 2003) Ref.1655

New Regional Environmental Offices in Asia to Strengthen Environmental Protection
In an effort to strengthen UNEP’s delivery of regional-level programs, a new office was opened in China. As part of an effort to promote the Northwest Pacific Action Plan (NOWPAP), a 1994
agreement made by China, Japan, South Korea and Russia to preserve the marine environment in Northeast Asia, regional coordination offices are also planned to open shortly in Toyama, Japan and Pusan, South Korea.

Environmental information centers opened in Baku, Azerbaijan and Dushanbe, Tajikistan as a step in the implementation of the United Nations Aarhus Convention (to promote public access to environmental information and encourage participation in decision-making in environmental affairs). The offices were opened with support from the Organization for Security and Co-operation in Europe (OSCE) and Azerbaijan's Ministry of Ecology and Natural Resources, and respectively the Tajik Ministry of Nature Protection. (August-September 2003) Ref.1656

At a recent waste management and pest control conference, a United Nations Environment Programme (UNEP) official said that many countries in West Asia had laws regarding the management of waste and environmental pollution, but that enforcement was problematic. The lack of technical expertise and infrastructure were also cited as barriers to more effective regional waste management. (August-September 2003) Ref. 256

*Kazakhstani* non-governmental organizations (NGOs) that concentrate on environmental issues are wielding growing influence over government policy, as was evidenced at a conference held in Almaty in early June 2003 that focused on developing new environmental legislation to be introduced into Parliament later this year. (August-September 2003) Ref.1657

**Network of Environment Centres in Central Asia**
The resolution adopted at the third regional seminar on the implementation of the Aarhus Convention in Central Asia, organized by the OSCE Centre in Dushanbe, calls for the set up of a new network of Aarhus Resource centers in five Central Asian states (Tajikistan, Kyrgyzstan, Kazakhstan, Uzbekistan and Turkmenistan) to raise environmental awareness and provide the general public with access to information. The network will improve the mechanism for implementing the Convention and help governments and civil society in the region to collaborate on decisions regarding environmental policy. (February 2004) Ref.1658

**Regional Environmental Center for Central and Eastern Europe**
REC-Hungary's role after EU enlargement in 2004 - The REC will continue to build environmental agreement monitoring and compliance capacity in Europe and developing countries. (January 2002) Ref. 1659

**NEW INITIATIVES AIMING TO INCREASE ECO-EFFICIENCY**

In an effort to set up more ambitious targets for reducing global warming and greenhouse gas emissions, several local and regional governments, organizations, and corporations launched new eco-efficiency initiatives.

**Global Investment Road Map for a Transition to a Greener Economy Launched by UNEP**
The United Nations Environment Program launched a Green Economic Initiative to encourage an environmentally friendly economy. A comprehensive road map will be delivered to all
governments within 18 to 24 months to help make the necessary transitions. Investments considered the most likely for economic returns and job creations are: clean energy and other clean technologies; sustainable agriculture; ecosystem infrastructure; cutting greenhouse gas emissions; and sustainable urban planning. (October 2008) Ref.1661

Green Economy a Solution for Addressing the Global Economic Crises
Fiscal stimulus packages adopted around the world to help address the economic crises include important measures involving renewable energy and environmental issues. Energy and climate change themes also dominated the World Economic Forum 2009, highlighting that industries related to energy-efficiency are a growing jobs-creating sector. The report Green Investing: Towards a Clean Energy Infrastructure, launched at the Forum, states that clean energy investment should more than triple—to at least $515 billion a year between now and 2030—to prevent emissions reaching unsustainable levels. In the same spirit, UN Secretary-General Ban Ki-moon suggests creating a global Green New Deal. Such initiatives could be important also to reduce potential social unrest in developing countries that could experience a reversal of progress due to the global financial crisis. The crisis could reverse progress by cutting access to capital markets, income from trade and remittances, money from voluntary contributions for UN and other international development efforts, and increasing economic nationalism. As tensions triggered by the economical crises already led to social unrest in several countries around the world, and climate change warnings increase, green economy policies should be implemented without delay as a comprehensive strategy to address both. [See also Briefings on Environmental Security at NATO Conference in April 2008 and other related items in previous environmental security reports.] (January 2009) Ref. 1662

Corporate CEOs Pledge Actions on Climate Change at UN Global Compact Summit
More than 150 CEOs signed the “Caring for Climate” platform at the UN Global Compact Summit held in Geneva July 5-7, including 30 from the Fortune Global 500. The pledge called for companies to reduce their carbon emissions and meet energy-efficiency targets, and called on governments to establish post-Kyoto market mechanisms to reduce greenhouse gas emissions. (July 2007) Ref.1663

Global Trends in Sustainable Energy Investment 2007—Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency in OECD and Developing Countries is a report by UNEP Sustainable Energy Finance Initiative and New Energy Finance organization. It is an overview of the financial aspect of the current status of sustainable energy development, with regional and sectoral trends. The analysis is intended for stakeholders and policy makers with involvement in sustainable energy. (July 2007) Ref.1664

Renewable Energy Projects May Face New Scrutiny
According to a paper published in Inderscience's International Journal of Nuclear Governance, Economy and Ecology, some renewable energy sources might not be so green and might even be damaging to the environment. The paper’s author, Jesse Ausubel, Director of the Rockefeller University's Program for the Human Environment in New York, focuses primarily on land use efficiency of the various alternatives (e.g. wind, biomass, hydro), and points to nuclear as the best choice from the standpoint of minimizing environmental footprint. (July 2007) Ref.1665
US EPA recommendations for "Green Infrastructure"
US EPA has a website for "green infrastructure," with information about improving relationships between the built and natural environments. (September 2007) Ref.1666

Green Un-building Becomes Major Environmental Goal
The practice of "green un-building" – environmentally friendly demolition – is becoming a major goal of environmental groups worldwide. Reuse or recycling of materials from destroyed structures can save enormous amounts of scarce resources. (October 2007) Ref.1667

Green Information Technology is forecasted as 2008 top IT Strategy
Gartner, Inc., a leading news source in information technology (IT), is predicting that concern for environmental issues will have a most significant impact on IT planning and operations over the next three years. The major factors involved here are energy conservation and efficiency, material conservation and recycling, and “green building” of data processing installations. UN-GAID will co-sponsor a conference and exhibit, The Positive Impact of ICT (Information and Communications Technology) on the Environment and Climate Change, on 27-28 November 2007, at the United Nations. Tutorials will focus on the role of information and communication technologies in assuring environmental sustainability. They will address the broader issue of information and communication technologies’ impact on the environment and climate change. (October 2007) Ref.1668

State of Green Business 2008
The State of Green Business report provides an example of a set of evaluations of environmental accomplishments. It takes stock of green business activities in the United States, and features the debut of the GreenBiz Index, a set of 20 indicators of green business progress that measures how efficiently companies are using resources, reducing toxics, purchasing green fleet vehicles and renewable power, and reporting social and environmental performance. It also features ten key green business trends of 2007 as well as lists of books, websites, reports, business initiatives, and other resources of the past year. (February 2008) Ref.1669

New “Green IT” Software under Development
A group at Oxford University’s Environmental Change Institute started development of “software that is free and easy to download, which will make networked computers more energy-efficient and reduce carbon emissions by saving on electricity needs.” The software will eventually be available from the project website: http://projects.oucs.ox.ac.uk/lowcarbonict. (March 2008) Ref.1670

Energy/Performance Benchmark for Workstations under Development
A new, environmentally-oriented project of the Standard Performance Evaluation Corporation (SPEC) Graphics and Workstation Performance Group is “working on the benchmark for performance in relation to power consumption, incorporating current benchmarks for 3D graphics as well as looking at workloads for rendering, financial modeling, video encoding and other processes” announced a Greener Computing news story. SPEC will be submitting the benchmark to EPA for use in its Energy Star rating system. (March 2008) Ref.1671
New Environmentally Friendly City in UAE Offers Cooperation Opportunity
A new mini-municipality, Masdar City, being built adjacent to Abu Dhabi, is intended as a hub for academic and corporate research on nonpolluting energy technologies, according to an article in the International Herald Tribune. The walled city of 2.3 square miles will be car-free and produce all its own energy from sunlight. (February 2008) Ref.1672

Switching to Green: A renewable energy guide for office and retail companies
The World Resources Institute (WRI) published a guidebook, Switching to Green: A renewable energy guide for office and retail companies, to provide organizations with easily understandable information on how to switch to renewable energy. (October 2006) Ref. 1673

Cleantech Report™ by Lux Research
Cleantech Report™ by Lux Research is a comprehensive analysis of emerging energy and environmental technologies with information ranging from statistics to funding and policies on cleantech. It notes that cleantechs are rapidly expanding: 1,500 cleantech start-ups operate worldwide, there were 29,874 cleantech-related scientific journal articles published in 2006, and 4,093 patents issued in the U.S. alone. (June 2007) Ref.1674

Idle Nighttime Computers Cited as Energy Wasters
A new report released by the energy management firm 1E and the Alliance to Save Energy points out the large amount of energy now being wasted by idle computers left running at night. The study calculated that 14.4 million tons of CO2 could be eliminated annually from atmospheric pollution in the U.S. if all of these machines were turned off when not being used for extended periods. (June 2007) Ref.1675

Efforts for Increasing Corporate Eco-responsibility
The “Responsible Investment Initiative” launched by the United Nations Environment Programme (UNEP) aims to develop by September 2005 a set of globally recognized principles for responsible investment to be considered by the major institutional investors. The initiative is framed in support of the Global Compact, a U.N. effort to enlist the support of the public and private sector for 10 key principles relating to human rights, labor and the environment, and is based on the recent study, “The Materiality of Social, Environmental and Corporate Governance Issues to Equity Pricing,” launched at the UN Global Compact Leaders Summit on 24 June in New York. The new principles will protect both the planet and long-term shareholder value by integrating environmental, social and governance concerns into investor and capital market considerations.

The World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) recently published the revised edition of The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, a framework for corporate GHG accounting and reporting, and a tool for helping companies more efficiently manage their GHG emissions. The next steps are: developing of Web-based GHG calculation tools; establishing complementary sector-specific protocols; and working on a new standard focused on the quantification of GHG mitigation projects. (July 2004) Ref.1676
UN Envisaging a Treaty for Multinational Corporations
The UN began a feasibility study and eventual steps for the implementation of an international treaty regulating multinational corporations’ activities. One of those closely involved in the process is Harvard professor John Gerard Ruggie, appointed by Secretary-General Kofi Annan as his special representative on the issue of human rights and transnational corporations. The special representative position was created for identification and clarification of "standards of corporate responsibility and accountability for transnational corporations and other business enterprises with regard to human rights." STRATFOR (Strategic Forecasting, Inc.) comments that the “appointment is important because it will galvanize a global social movement, which will in turn accelerate the changing systems of public policy development.” It might take five years until a draft treaty will be drawn. (August 2005) Ref.1677

Climate Change Dialogue Initiative Launched
Government officials and business leaders of G8 and five major developing countries (India, China, Brazil, Mexico, and South Africa) launched the Climate Change Dialogue initiative to campaign for more aggressive action to tackle climate change. Part of the new group are also institutions such as the World Bank, International Energy Agency, and oil giant BP. The group hopes to attain some concrete policy proposals for the G8 summit in Japan in 2008. (February 2006) Ref. 1678

Second Australia-New Zealand Climate Change and Business Conference
“Climate change responses are going to be delivered by business, responding to Government policy-setting,” said Gary Taylor, Environmental Defence Society chairman at the second Climate Change and Business Conference held in Adelaide, February 20–21. Over 300 delegates representing business, environmental, and governmental organizations, discussed how individual businesses could help in coping with climate change and greenhouse gas emission issues. Many suggested that Australia would continue to get hotter while New Zealand would continue to get wetter. The problem posed for Australia would be lower crop outputs and higher pest problems, with consequent food security implications. (February 2006) Ref.1679

Two Global Alliances for “Greener” Buildings Around the World
The UN Environment Programme (UNEP) and major companies worldwide in the construction industry launched the Sustainable Building and Construction Initiative (SBCI), whose purpose is to promote environment-friendly practices throughout the industry. According to Monique Barbut, director of UNEP’s Division of Technology, Industry and Economics (DTIE), which hosts the SBCI secretariat, the project's objectives include the worldwide adoption of sustainable building and construction practices that can help deal with problems like climate change, waste disposal, and depletion of natural resources; the development of pilot projects that embody its recommendations; and the inclusion of sustainability considerations in legislation and building standards. Another alliance initiated by the World Business Council for Sustainable Development (WBCSD) of such companies as United Technology and Lafarge Group is promoting construction standards that would make new buildings energy self-sufficient (no dependency on external power grids) and carbon-neutral. Their initial focus is on new buildings in China, India, Brazil, the United States and the EU. Ref. 1680
UNEP and 150 Labor Unions Agree on Environmental Objectives
The Trade Unions’ Assembly on Labour and the Environment, a joint meeting of UNEP and representatives from over 150 trade unions, set forth "a wide ranging strategy to mainstream environment and sustainable development within the trade unions movement", embodied in the "Workers’ Initiative for a Lasting Legacy". The unions agreed to support the UN Millennium Development Goals, the Johannesburg Plan of Implementation, action on climate change, and promotion of sustainable production and consumption patterns. According to the UNEP announcement, "Other areas include working for the ratification and implementation of key treaties that promote important social, economic and environmental objectives alongside monitoring of governments so that their purchasing, regulation and land-use policies meet sound social and environmental targets." (January 2006) Ref.1681

Prospects for Hydrogen and Fuel Cells
Prospects for Hydrogen and Fuel Cells, a study by the IEA, assesses the present state of affairs in research and potentials of hydrogen and fuel cells, and investigates several aspects related to future energy markets, innovative technologies and policies needed to promote the use of hydrogen as an energy carrier and fuel cells as motive devices in transportation and energy distribution systems for the next half century. Additionally to the analysis, it also provides four scenarios for a hydrogen and fuel cells transition, along with governance and decision-making suggestions for addressing the world’s energy problems. (December 2005) Ref.1682

The Future of Technology Assessment
The Future of Technology Assessment is a collection of three essays published by The Foresight and Governance Project of the Woodrow Wilson International Center for Scholars. It explores the issue of science and technology assessment and related policymaking from multiple perspectives and with a look towards a future that will be fundamentally influenced by the way science and technology will evolve and be addressed. It highlights the importance of making a clear distinction between handling basic and applied science. The first essay, Back to the Future: Revisiting OTA Ten Years Later, by Michael Rodemeyer, reviews technology assessment issues in the U.S. after the dissolution of the Office of Technology Assessment (OTA), pointing out that the rate of change and globalization make policy- and decision-making difficult to assess and to react to all possible implications of new technologies. Concluding that there is no institutional arrangement for technology analysis, the author contemplates the eventual necessity of an internal or external technology assessment capability. The second essay, This Won’t Hurt a Bit: Assessing and Governing Rapidly Advancing Technologies in a Democracy by Daniel Sarewitz, analyzes the transition from conventional to real time technology assessment in the condition of democracy, of complex social settings, when S&T should reflect and serve the system of values of the whole community. The third essay, Paddling Upstream: New Currents in European Technology Assessment, by James Wilsdon, analyzes the science-society relationship, outlining the need and process of public participation in decision-making concerning science. (December 2005) Ref.1683

UK Analysis of Current Green Energy Options
The Which Energy? report by the Institute of Science in Society is an assessment of many energy options regarding accelerating global warming and depleting fossil fuels. Bringing together the science, ethics, economics, safety, and politics of available energy options, the report puts
forward recommendations for cleaner energy policies and actions, including ruling out nonrenewable sources and techniques that are not environmentally friendly and/or safe for society (e.g. nuclear), and advocating energy self-sufficiency as the best guarantee for energy security. Although this report does not include such high tech items as genetically engineered photosynthesis to produce hydrogen or orbital solar power satellites for base load electricity, it is nevertheless a very good review of current alternative “green” energy solutions. (April 2006) Ref.1684

**Renewables 2005: Global Status Report**

*Renewables 2005: Global Status Report* published by Worldwatch Institute, is a comprehensive overview of today’s global renewable energy status and provides trends and estimations, as well as a look at emerging renewable energy technologies and policies. According to the report, government support for renewable energy is growing rapidly, with at least 48 countries (including 14 developing ones) already having some type of renewable energy promotion policy. (November 2005) Ref.1685

**Target 2020: Policies and measures to reduce greenhouse gas emissions in the EU**

*Target 2020*, a new report by the Wuppertal Institute in Germany, outlines concrete steps that would allow the EU to cut its greenhouse gas emissions to a third of their 1990 level, by 2020. The recommendations include adoption of comprehensive climate policy strategies at regional and national levels, consisting of mandatory regulations promoting energy efficiency and renewables. To illustrate the analysis, the report compares two scenarios over the period 1990–2020: The “Business-as-usual” scenario—to be avoided, and the recommended “The Policies and Measures (Target 2020)” scenario, which implies high energy-efficiency strategies and policies. (November 2005) Ref.1686

**New REN21 Report Links Renewable Energy to Climate Change Solutions**

*Changing Climates, the Role of Renewable Energy in a Carbon-Constrained World*, a new report by Renewable Energy Policy Network for the 21st Century (REN21), was launched during the 9th Special Session of UNEP’s Governing Council/Global Ministerial Environment Forum [see Item 2 above]. Noting “emerging consensus” in both the scientific and political communities that renewable energy is a major player in meeting the growing global energy demand and the increasingly serious environmental and economic threats of climate change, the report highlights the need for more aggressive strategies and specific economic and policy tools adapted to local circumstances. Also, remarks the report, with the current development of the global market for renewable energy, “it is not necessary to wait for strengthened global agreements before taking action at the national level.” (February 2006) Ref.1687

**China and India Sign Precedent-Setting Energy Agreement**

How the world prepares for the advent of “peak oil,” will be a major factor in determining the future of war and peace. Will the major consumers and producers plan for the peaceful decline in oil and gas supplies or...? India and China have decided to cooperate and have signed the "Memorandum for Enhancing Cooperation in the Field of Oil and Natural Gas" which outlines comprehensive cooperation concerning hydrocarbons, including trading and joint bidding in third countries; research and development; exploration and production; conservation; and promotion of environment-friendly energy. A joint committee will be established to monitor implementation and facilitate dialogue and information sharing. This new agreement is in addition to the two nations’ previous commitments to cooperate for accelerating the development...
Chinese Popular and Government Support for Environmental Concerns
Environmental awareness and anger seem to be increasing among the Chinese people, and even certain segments of the government are taking up environmental causes. Pocha (Dec 2005) writes, "A growing section of the Chinese leadership, led by Deputy Environment Minister Pan Yue, has been vocal in calling for China to make its economic policies more environmentally sensitive… Earlier this year, China's State Environmental Protection Administration took the unprecedented step of suspending work on 30 projects, worth more than $10 billion collectively, after they failed to meet environmental standards." There are now more than 2,000 grass-roots environmental NGOs in the country, many of which are now learning how to organize and empower themselves. Although the government is still focusing on high economic growth with little regard to environmental impacts, there are signs that this situation is changing. China recently announced that it would begin monitoring energy efficiency and encouraging cleaner energy production and use as its national income surges. Its National Bureau of Statistics is compiling an index to show each region's energy consumption per unit of GDP for publication every six months. (December 2005) Ref.1689

Chinese Automobile Industry’s Potential Environmental Emphases
China is the world’s fastest-growing car market and may surprise the world at how fast it becomes a major automobile producer of next generation cars (as it surprised the world at how fast it became the world leader in mobile phone usage). 150 experimental and advanced-technology vehicles were on display at the Challenge Bibendum, an exhibition of eco-friendly cars held in Shanghai. The China Daily speculates that the rising cost of oil and the forthcoming Olympics (2008) and World Expo (2010) are strong incentives to make China a green car leader, rather than following the gasoline model. (October 2004) Ref.1690

New Israeli Venture Capital Fund for "Clean Tech" Enterprises
Israeli entrepreneurs and venture capitalists are fueling a burgeoning new crop of "clean technology" enterprises devoted to cleaning up the environment. A "cleantech" venture capital (VC) fund is being formed by the Millennium VC firm. Water management is a central element of many of these efforts. The fund’s manager says that, "In five years it [Israel] will be the only country to use all of its wastewater, mainly for agriculture." (June 2005) Ref.1691

Green Buildings in North America Project Started
The Commission for Environmental Cooperation (CEC) officially begins its study, Green Building in North America: Opportunities and Challenges, hoping to increase the role of environmental considerations in the design of buildings across the continent. A 20-member interdisciplinary and international advisory group will assess the current status and prospects for green building, and identify eventual obstacles as well as potentials—including environmental benefits. Green building is very weak in North America, although it is estimated that U.S. buildings consume 65% of all electricity generated, 40% of raw materials and generate about 30% of all greenhouse gas emissions. The advisory group will present a report and provide the CEC Secretariat with recommendations for the final report, expected in the fall of 2007. [See also Two Global Alliances for “Greener” Buildings Around the World in April 2006 environmental security reports] Ref.1692
Global Greenhouse Gas Register creates a global standard for the disclosure of corporate greenhouse gas emissions and reduction targets
Ten multinational companies that are responsible for 5% of the global carbon dioxide emission have already agreed to participate in the new effort. The Global Greenhouse Gas Register (GHR) launched at the recent World Economic Forum meeting in Davos, Switzerland, creates a global standard for the disclosure of corporate greenhouse gas emissions and reduction targets. This is a voluntary system with a Web site to be accessible in February. This common platform will allow the participating companies to enter data on their emissions and promote transparency. Ten multinational companies that are responsible for 5% of the global carbon dioxide emission have already agreed to participate in the new effort. The Register was first announced on 9 December 2003 in Milan, Italy, during the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP9) meeting. (January 2004) Ref.1693

UNCTAD Manual for the Preparers and Users of Eco-efficiency Indicators contains new guidelines on corporate environmental accounting
In February the United Nations Conference on Trade and Development (UNCTAD) released the Manual for the Preparers and Users of Eco-efficiency Indicators, containing guidelines on eco-efficiency indicators that link the financial achievement of a corporation to its environmental performance. The Manual helps to standardize the presentation and disclosure of a company’s environmental performance and how to relate it to its financial results. The Ciba Specialty Chemicals multinational is the first company to base its environmental reporting on the UNCTAD model. (February 2004) Ref.1694

European Pollutant Emission Register (EPER) gives access to information on annual industrial emissions into air and water of about 10 thousand industrial facilities
The European Pollutant Emission Register (EPER) gives access to information on annual industrial emissions into air and water—mostly since 2001—of 9256 industrial facilities in the 15 Member States of the EU as well as Norway. The information can easily be searched and/or grouped by pollutant, activity (sector), air and water (direct or via a sewerage system) or by country. It is searchable by name or by clicking on a map, or by sources of a particular pollutant. (February 2004) Ref.1695

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