

**WORLDWIDE EMERGING ENVIRONMENTAL ISSUES
AFFECTING THE U.S. MILITARY**

BY

THE MILLENNIUM PROJECT

FOR

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July 2009—June 2010

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INTRODUCTION

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.

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
- protecting the environment due to its inherent moral value.

This report presents a summary of recent events and emerging environmental security-related issues organized around this definition. More than 300 items have been identified during the past year and over 2,000 items since this work began in August 2002. For a complete version of the reports organized by months, see the Army Environmental Policy Institute web page <http://www.aepi.army.mil/reports/>.

* * *

I call on Member States to clarify and expand international law on environmental protection in times of war. Existing legal instruments should be adapted to reflect the predominantly internal nature of today's armed conflicts.

UN Secretary-General Ban Ki-moon
International Day for Preventing the Exploitation of the
Environment in War and Armed Conflict, 6 November 2009

While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world.

2010 Quadrennial Defense Review
United States Department of Defense

1. EXECUTIVE SUMMARY

The traditional nation-centered security focus is expanding to a global one due to geopolitical shifts, the effects of climate change, environmental and energy security issues, and growing global interdependencies. Environmental security-related concerns are becoming defining factors in international political and military negotiations.

The transnational nature of environmental security is triggering new forms of defense strategies and cooperation. Multipolar global political, economic, and military power, the increasing demand on natural resources, economic turmoil, population growth, the deepening gap between those who could cope with the effects of climate change and those who could not, the accelerated rate of technological advancements, the growing strength of organized crime and terrorism, and the proliferation of weapons of mass destruction all fuel uncertainty about the future of international security. These changes are so fast and complex that it is increasingly difficult to design realistic long-term strategies and impossible for any single nation to manage these changes alone. Since conflict and environmental degradation exacerbate each other, unless they are addressed together, their scope and severity could expand.

Environmental diplomacy increasingly contributes to confidence building, while nontraditional security issues—including environment, migration, and social development—have become standard aspects in security planning. The ability to identify environmental threats and crimes has been strengthened by increasingly powerful detection and monitoring technologies and by environmental jurisprudence supported by improved enforcement mechanisms. Environmental damages that people and organizations got away with in the past are less likely to escape exposure and punishment in the future.

Preventing or Repairing Military Damage to the Environment

The U.S. Pentagon's *Quadrennial Defense Review 2010* specified climate change for the first time as a key issue “that will play a significant role in shaping the future security environment.” Many UK embassies have “climate security” position, and all regional security organizations, governments, and a growing number of international organizations and think tanks have global security implications of climate change on their agenda. Many other security leaders now recognize that climate change and environmental degradation are a threat multiplier with large-scale implications, affecting both resource-scarce and resource-abundant countries. While countries affected by scarcity might experience local social unrest, resource-abundant countries might experience increased immigration and exposure to extremism, terrorism, and organized crime.

Military organizations increasingly integrate environment in conflict analysis and all phases of operations planning. The U.S. Army's Strategy for the Environment shows military leadership in protecting the environment, increasing energy efficiency through procurement and operations, R&D centers of excellence, and the transfer of knowledge. Including environmental factors in military actions gives strategic advantages in combat and post-conflict operations, protects the health, safety, and security of the troops, and develops diplomatic relations and the confidence of local populations and neighboring countries, thus increasing the missions' success. Security

experts emphasize that energy and environmental standards should be considered in security-related reconstruction and stabilization activities (e.g., improved agricultural practices and alternative energy systems), along with information sharing to assess the future needs of individual communities or countries.

UNEP reports that since the mid-twentieth century more than 90% of major armed conflicts took place in countries that contained biodiversity hotspots and over 80% occurred directly within a hotspot area, further threatening biodiversity. The Pacific Institute's Water Conflict Chronology Map identifies more than 100 conflicts over the past 25 years that were water-related. While conflicts driven by factors related to natural resources and/or environmental degradation are twice as likely to return to violence or become "re-wars" within five years, UNEP notes that fewer than 25% of relevant peace agreements address environmental or resource aspects.

The environment is also often used as a military tool—from bombing infrastructure to poisoning the water and destroying the ecosystem. Not only does environmental degradation contribute to conflict, it also prolongs it, impeding peacekeepers' deployment in the area.

Although Protocol 1 of the Geneva Conventions contains text protecting the natural environment, UNEP notes that there are no mechanisms to protect natural resources during armed conflict and no permanent international authority to monitor violations and to address liability and redress claims for environmental damage in those situations. There is also no agreement on definitions for "widespread," "longlasting," and "severe" or a standard definition of what constitutes a "conflict resource" or illegal resource exploitation and trade. Furthermore, the majority of international legal provisions protecting the environment during armed conflict—including the ICRC Guidelines on the Protection of the Environment during Armed Conflict (1994)—were designed for international armed conflicts, while the majority of today's conflicts are internal; hence the legal instruments do not apply.

UNEP recommends that the Permanent Court of Arbitration and its "Optional Rules for Conciliation of Disputes Relating to the Environment and/or Natural Resources" should be considered for addressing disputes related to environmental damage during armed conflict and that a summary report on the environmental impacts of armed conflicts should be presented annually to the UN General Assembly.

There are proposals to amend the Rome Statute of the International Criminal Court to cover the use of certain weapons in international and non-international conflict situations, as well as to expand the list of war crimes to include the use of chemical, biological, and some conventional weapons and anti-personnel mines, as well as bringing the crime of terrorism within the jurisdiction of the Court.

An increasing number of vulnerable states that fail to overcome cultural, social, political, and economic barriers to successfully address environmental challenges make managing international crises more difficult. In Niger, for example, food insecurity that affects more than 7 million people and political instability (aggravated by the February 2010 coup d'état) exacerbate each other.

The 2010 Environmental Performance Index reveals that most of the lower-ranked nations are also vulnerable states. Comparing world peace status (from the Global Peace Index) with potential security risks triggered by environmental issues could help address present vulnerabilities efficiently and avoid foreseeable ones.

UNDP argues that environmental stresses challenge the Arab region's security. Lebanon might lack fresh water by 2015, due to the interplay of several factors, including the 1975–90 civil war and years of political unrest, water rights disputes with Israel, weak water management, and inappropriate infrastructure, all of which are exacerbated by a growing population. Additionally, some transboundary rivers are not exploited due to their strategic locations—such as the Nahr al-Kabeer and Orontes shared by Lebanon and Syria and the Wazzani and Hasbani shared with Israel. An estimated 80% of conflicts in Yemen are over water. And if present trends continue, in five to seven years Sana'a could become the first waterless capital in the world. Water used in Yemen for agriculture accounts for about 90% of all consumption, and about 50% of it goes to growing qat (khat), a mildly narcotic plant. Since plantations are often controlled by the so-called qat mafia, offering farmers an alternative to qat would address critical water, food, and security situations together.

The UN Mission assessment of the Gaza conflict (December 2008–January 2009) found evidence that both Israeli forces and Palestinian militants committed actions that could be violations of international law. The Mission assessed particularly the use of white phosphorus, fléchette missiles, DIME (dense inert metal explosive) munitions, and depleted uranium, and it suggested legal restriction on the use of these weapons.

“It will take centuries to restore the natural environment of Iraq,” said Iraqi Environment Minister Nermeen Othman, referring to the environmental catastrophe caused by the conflict: unexploded bombs and 25 million land mines littering the land, hazardous waste and leaking poison from destroyed factories, chemical waste, rubble and trash, and chemical weapons and depleted uranium munitions that have created 105 contaminated areas. More than 60% of Iraq's fresh water is polluted.

Environmental degradation and hazardous ordnance leftovers in many post-conflict areas around the world threaten the livelihoods and health of current and future generations and may constitute an impediment for lasting peace. Leaking abandoned ordnance since World War II and dangerously high levels of heavy metals and other toxic chemicals related to military exercises are contaminating the oceans, endangering the marine ecosystem and human health.

The Convention on Cluster Munitions enters into force in August 2010, two years after its adoption. It bans the use, production, and transfer of cluster munitions and sets deadlines for stockpile destruction and clearance of contaminated land, as well as prescribes responsibilities toward affected communities. As of mid-2010, 34 countries had ratified and 106 had signed the convention. This sets a precedent on how a “coalition of the willing” can successfully lead to international regulations, and it might trigger similar negotiations and be emulated for other weapons.

In the meantime, concerns over nuclear threats persist. The International Atomic Energy Agency reports that between 1993 and the end of 2009, the Illicit Trafficking Database recorded 1,784 nuclear trafficking incidents (222 during 2009), ranging from illicit disposal efforts to nuclear material of unknown provenance. As of the end of 2009, 109 IAEA member states participated in the reporting program.

Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan, supported by a consortium of national and international organizations, are taking measures to reduce the threat posed by nuclear and hazardous material left over from the Soviet era. Some 800 million tons of radioactive and toxic waste are stored in vulnerable depots, threatening environmental contamination and specific contamination and increasing “dirty bomb” threats.

With the entry into force of the Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, nuclear weapons will be banned throughout the entire southern hemisphere. The other regional agreements banning nuclear weapons in their area are the Antarctic Treaty, the Treaty of Tlatelolco (for Latin America and the Caribbean), the Treaty of Rarotonga (for the South Pacific), the Treaty of Bangkok (for Southeast Asia), and the Treaty of Semipalatinsk (for Central Asia). Representatives of the Japanese and Republic of Korea parliaments held the first in a series of regional parliamentary dialogues on creating a Northeast Asian Nuclear-Weapons-Free Zone, while Egypt and other Arab countries are promoting the creation of a Middle East Nuclear-Weapons-Free Zone. The U.S. Nuclear Posture Review aims to reduce the role of nuclear weapons in U.S. national security strategy. A bill was submitted to the Belgian Senate in 2009 on the manufacturing, fixing, sale, shipping, and possession of nuclear arms. The new Strategic Arms Reduction Treaty (START) was signed by the U.S. and Russia (together holding more than 90% of the world’s nuclear weapons), requiring each to reduce their strategic nuclear arsenal, although critics note that the treaty does not address the disposal of the nuclear material contained in the weapons. Global Zero is a new effort launched by international leaders to eliminate all nuclear weapons worldwide within 25 years. The UN Security Council resolution aiming to advance global nuclear disarmament stipulates that non-compliance with the Nuclear Nonproliferation Treaty would be referred directly to the Security Council rather than to the IAEA.

While the chemical and nuclear weapons conventions have enforcement mechanisms, the Biological Weapons Convention does not, and negotiations on this aspect are at a deadlock, although they are expected to continue at the 2011 review conference. The report of the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism warns that by 2013 an attack is likely to occur somewhere in the world involving a weapon of mass destruction, most probably a biological attack.

New technologies are offering improved detection, cleanup, monitoring, and surveillance possibilities. Intelligent battlefield robots will have elements of the rules of engagement and the Geneva Convention built into their programming. A NASA project tested the concept of a network of rugged, autonomous, environment-sensing “spiderbots” that can be placed into a hazardous environment to communicate among themselves and with the outside world, including satellites, to monitor an environmental situation. Ultra-sensitive portable chemical and biological devices offer increasing accuracy in detection, monitoring, and cleanup, with rapid response time.

However, future autonomous robotic weapon systems are increasing vulnerability and concern over possible catastrophes. The development of synthetic biology, cognitive science, nanotechnology, electromagnetic pulses, and other high-tech advances, combined with the availability of information and low-cost components necessary to produce WMDs as well as the increase of terrorism and social unrest (often exacerbated by environmental factors), are increasing the threat of terrorism and SIMAD (a single individual massively destructive). “E-bombs” based on electromagnetic pulses are capable of destroying the electronics in civilian aircraft, suitcase-sized electronic warfare devices can disable the power grid of an entire region, and research on computer-mediated telepathy such as Silent Talk might one day be used to intercept and distort thoughts.

After land, sea, air, and space, cyberspace became the “fifth battlespace” on the agenda of security experts. The disruption of critical infrastructure such as water or electricity by cyberattacks in an IT-dependent world calls for exceptional strategies. Security experts call for a new legal and policy framework for addressing cybersecurity challenges—cybercrime, cyberespionage and reconnaissance, and cyber-leveraged war.

Preventing or Responding to Environmentally Caused Conflicts

The UN identifies five channels through which climate change can have security implications: impacts on livelihoods and vulnerable people, economic development, population migration and/or conflict over scarce resources, displacement of whole communities due to sea level rise and consequent statelessness, and access to internationally shared resources.

A study assessing quantitative links between climate change and the risk of civil war in sub-Saharan Africa found that between 1980 and 2002, the incidence of conflicts across the continent rose by nearly 50% with a 1°C temperature increase in a given year. Using these assumptions and 20 global climate models, the researchers warn that without swift mitigation action, the incidence of African civil wars could increase 55% by 2030 relative to 1990.

The Pacific Institute notes that a pattern of localized conflict is likely to emerge in sub-Saharan Africa, Southeast Asia, India, China, Pakistan, and Burma in coming decades, although “water war” or full-scale interstate warfare triggered by water is unlikely. It warns that terrorist groups could start to view water infrastructure as valuable targets as tensions rise over water’s availability. In addition, in countries like Pakistan, discontentment with the West could intensify as water becomes scarcer, which could help extremists with recruitment.

Weather pattern changes observed now in some parts of the world were not expected until 2020, and “worst case” scenarios are already becoming reality. UNEP notes that global average sea level rise was 3.4 mm/year over the past 15 years, 80% above the IPCC forecasts. According to NOAA, the 2000–09 decade was the warmest since instrumental measurements of temperatures began in the 1880s. The Met Office notes that in 2010 a new El Niño warming period started, and the sun should also begin to brighten, as part of its 11-year fluctuation cycle (in 2009 it was at the bottom of the cycle). It forecasts that by 2060, the global average temperature could rise by 4°C (7.2°F) unless sound greenhouse gas emission reduction strategies are implemented.

Satellite measurements reveal that the Arctic Ocean's permanent ice cover around the North Pole has thinned by more than 40% since 2004. Experts are therefore reassessing the timing of when the Arctic would be ice-free in the summer. Some estimate that the "northeast passage" for shipping around Russia's Arctic coast and across the North Pole will be opened within a decade. The route through previously inaccessible Russian waters would cut sailing times between Rotterdam in the Netherlands and Yokohama in Japan by 40%, while also providing a safer and "pirate-free" route for global shipping. Circumpolar countries are actively expanding their scientific, economic, and military presence in the Arctic due to the eventual availability of massive oil and gas reserves.

The number of people around the world needing humanitarian assistance due to natural catastrophes triggered by climate change might increase from 250 million today to more than 375 million by 2015. Therefore, the UK Government announced that it would recommend a doubling of the UN relief funds budget from the current \$500 million to \$1 billion, along with a reconsideration of the entire system.

The World Bank notes that poor nations will bear 75–80% of the cost of floods, increased desertification, and other disasters caused by global warming, and it estimates that by 2030, developing countries will need \$75 billion annually for adaptation and another \$400 billion for low-carbon technology development. The EU estimates that €100 billion (\$135 billion) a year by 2020 would cost-effectively address climate change.

Countries in Africa and South Asia might lose as much as 5% of their GDP if temperatures rise just 2°C above pre-industrial levels. The UN is setting up a Global Impact and Vulnerability Alert System to help poorer countries such as those in the Pacific region deal with the combined effects of the global economic crisis and climate change. The Global Climate Risk Index 2010 compiled by Germanwatch shows that the top 10 countries most affected in the past 20 years by extremes of climate are Bangladesh, Myanmar, Honduras, Vietnam, Nicaragua, Haiti, India, the Dominican Republic, the Philippines, and China. The small island developing states, in addition to vulnerability, are concerned about lack of any bilateral or multilateral agreements for eventual relocation, as well as sovereignty status.

If current trends continue, most glaciers from the mountains of tropical Africa will disappear by 2030, and those from the Pyrenees by 2050. Chinese climatologists report that temperatures in Tibet have risen by an average 0.32°C (0.58°F) per decade since 1961, when meteorological records began, which is considerably higher than the global average of 0.2°C (0.36°F) per decade. The *Africa Factbook 2009* by the Global Footprint Network warns that if current population and consumption trends continue, Africa's Ecological Footprint will exceed its biocapacity within the next 20 years.

Since 70% of fresh water is trapped in glaciers, once they are gone the situation for human survival will become critical. According to the World Economic Forum, almost 4 billion people will live in areas of high water stress by 2030. In order to feed 9.1 billion people by 2050, world food production should increase by 70% and withdrawal of water for irrigation by almost 11%, notes FAO. According to some assessments, 38% of the world area, in 8 out of 15 existing eco-

regions, is at risk of desertification due to unsustainable land use practices. While genetically engineered seeds adapted to a harsher climate could help increase yields, researchers warn that growing corporate control over seeds is reducing the diversity of traditional seed varieties and traits that help farmers adapt to the effects of climate change, jeopardizing poor farmers' livelihoods and strongly influencing food prices. Additionally, even if all global biofuels targets were to be met, food prices could still rise by an additional 76% by 2020 and force an extra 600 million people into hunger, warns ActionAid.

According to the Environmental Justice Foundation, nearly 10% of the world's population is at risk of displacement by climate change, and up to 150 million "climate refugees" might move to other countries by 2050. Tuvalu, Fiji, the Solomon Islands, the Marshall Islands, the Maldives, and some of the Lesser Antilles are all in danger of losing a significant part of their land in the next 50 years, while countries that could see large movements of people include Bangladesh, Kenya, Papua New Guinea, Somalia, Yemen, Ethiopia, Chad, and Rwanda.

Asteroid-comet hazard and international legal aspects of counteracting the impact hazard are also rising on the international security agenda. In March 2009 an asteroid missed Earth by 77,000 kilometers, 80% closer to the planet than our moon is. If it had hit Earth, it would have wiped out all life on 800 square kilometers. No one knew it was coming. NASA already has a Near-Earth Object Program Office, and Italy and Spain cooperate on NEODYS (Near Earth Objects Dynamic Site). Participants in the Russian State Duma hearings on planetary security stated that it was time for Russia to supplement its national space program with the study of the asteroid hazard and possible ways to protect Earth.

Modeling systems are improving, but a better coordination of data, science, research, policy, and funds allocation is needed to address the complexity of the effects of climate change adequately and to design satisfactory adaptation, mitigation, and security strategies. The Millennium Project is developing a Climate Change Situation Room as a collective intelligence connecting science, policymaking, relevant discourse, technologies, and actions for addressing climate change.

Protecting the Environment Due to Its Inherent Moral Value

The World Resources Institute reports that there are about 350 environmental courts in 41 countries; about half of them were created in the last five years. International lawsuits for environmental crimes are increasing, including those based on damages due to climate change, which is a new phase in the international environmental legal system. Bolivia's President, Evo Morales, is promoting the creation of an international court on environmental crimes and a "universal proposal for the rights of mother Earth."

There are more than 700 multilateral environmental agreements. The focus of international negotiations is switching from designing new treaties to reinforcing existing ones and strengthening international environmental governance. The first simultaneous meeting of the Conferences of the Parties to the Basel, Rotterdam, and Stockholm Conventions was held in February 2010 to foster synergies among the three main treaties that address hazardous chemicals and waste. This synchronization could be a test case for improved global environmental governance by increasing coherence in decisionmaking and monitoring at

international, regional, and national levels. Integration is also initiated among regional regulations. For example, China, Japan, and South Korea have set the broad framework for adapting their chemicals regulatory systems to the EU REACH system.

Evaluation mechanisms of the effectiveness of agreements are improving, and increasingly powerful analytical tools are being created to compare national environmental status. New international watchdog bodies have emerged and others are being proposed to assist legal action against environmental crimes, and indexes are being created to measure progress and assess policy efficiency or to set priorities.

Although the UN Conference on Climate Change held in Copenhagen failed to extend or replace the 1997 Kyoto Protocol, it produced the non-binding Copenhagen Accord that calls for international cooperation to limit atmospheric CO₂ to make sure the global temperature does not rise more than 2°C. In response, about 60 countries have submitted national plans; however, the Climate Interactive team estimates the current proposals would still cause the average temperature to rise by approximately 3.9°C (7.0°F) by 2100. Some suggest amending the Montreal Protocol or similar existing international regulations to cover greenhouse gases in order to speed international cooperation.

Since the oceans absorb approximately a third of CO₂ emissions, they will continue to become more acidic unless human-made CO₂ emissions are substantially curbed or controlled by technological means. If current trends continue, 10% of the Arctic Ocean will be corrosively acidic by 2018, 50% will reach that condition by 2050, and the whole ocean will be acidic by the end of the century. In the meantime, global warming is changing ocean salinity, making some regions saltier while other are getting fresher, according to Australian CSIRO Wealth from Oceans Flagship, using data gathered by the global network of 3,200 Argo buoys.

Although the number of marine protected areas increased over the past years, the world is still far from the commitment that 10–30% of waters to be protected by 2012. Scientists now warn that in order for the protection to be efficient, marine protected areas, which currently limit fishing in 1.6% of the waters claimed by countries, need to be located in the right spots. UNESCO announced that the first globally integrated oceans assessment system could be delivered under the auspices of the UN by 2014.

Experts warn that the approximately 300 agreements among states that border a shared river might not adequately address future pressures, mostly those caused by climate change. The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (the Water Convention) of the UNECE adopted a guidance on water and adaptation to climate change, the first of its kind looking at adaptation from a transboundary perspective.

UNEP's *Year Book 2010* states that biodiversity changes due to human activities in the past 50 years were the most significant in human history. The IUCN Red List shows that 17,291 species out of 47,677 assessed are under threat: 21% of mammals, 70% of plants, 37% of freshwater fish, 35% of invertebrates, 30% of amphibians, and 12% of birds.

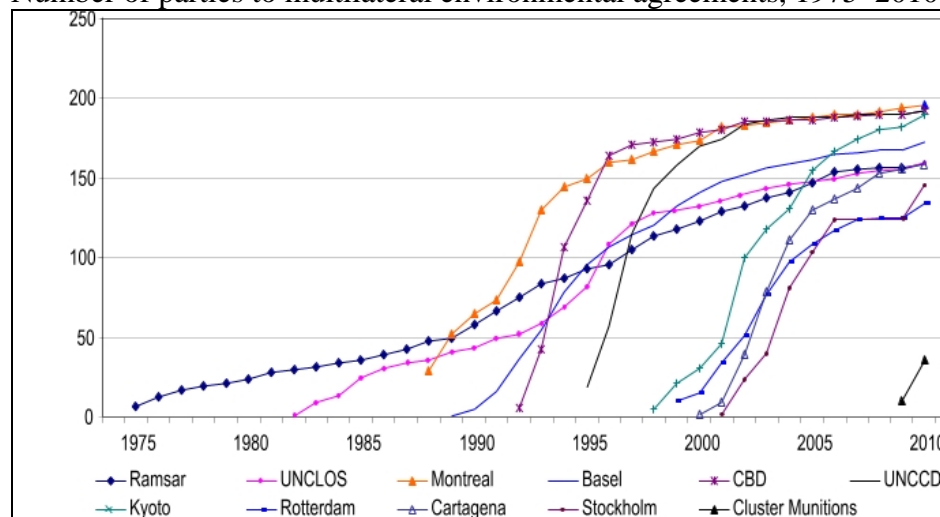
The emergence of nanotechnology and synthetic biology and the proliferation of personal electronics brings new international environmental security requirements. The Secretariat of Strategic Approach to International Chemicals Management released an update on current emerging policy issues related to nanotechnologies and manufactured nanomaterials, hazardous substances within the life cycle of electrical and electronic products, chemicals in products, and lead in paint. The EU is assessing the relevance and eventual modification for including nanomaterials within the REACH context. Changes to the U.S. 1976 Toxic Substances Control Act will require establishing priorities for tens of thousands of chemicals currently on the market.

Electronic waste grows globally by 40 million metric tons a year, according to UNEP, and is expected to rise dramatically in developing countries, which are vulnerable to illegal trafficking of hazardous waste unless regulations are strengthened and enforced. Computer waste in India alone is projected to grow by 500% by 2020 compared with 2007 levels. China, Brazil, and Mexico are also among the countries highly vulnerable to rising environmental damage and health problems from hazardous waste. A series of raids in the UK to enforce the EU’s Waste Electrical and Electronic Equipment Directive revealed increased involvement of organized crime in the illegal export of irreparable electric and electronic equipment to developing countries, mostly in Africa. Organized crime is primarily interested in retrieving some valuable parts of those devices. Italian “mafiosi” confessed that they have been disposing of toxic waste by putting it onboard ships and then deliberately sinking the vessels.

Most new technologies require rare earth elements for their manufacture. However, the distribution and exploitation of these elements is limited, with over 95% of them produced in China. Experts warn that demand for fast-growing green technology might outpace supply.

In view of increased threats of conflicts triggered by environmental factors, enforcement of international multilateral agreements should be strengthened. The following figure reveals significant efforts on ratifications, but more is needed in the area of implementation of the regulations, as well as in developing a global environmental consciousness.

Number of parties to multilateral environmental agreements, 1975–2010



Source: UNEP GEO Data Portal with compilation by the Millennium Project

2. ENVIRONMENTAL SECURITY MONTHLY SCANNING ITEMS

A. Preventing or repairing military damage to the environment

ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA

Pentagon's Quadrennial Defense Review Addresses Climate Change
UNEP Year Book 2010 Addresses 'warfare ecology'
UN Panel Meeting on World Water Day to Discuss How to Avoid Water Wars
Including Security Implications of Climate Change on the Copenhagen Agenda
G8 and G20 Integrate Security and Environmental Issues in Development
Environmental Courts and Tribunals Are Rapidly Increasing Around the World
International Lawsuits for Environmental Crime Proliferate
New Approach to Environmental Crime
OSCE is Enhancing Environmental Security in Central Asia
East Africa to Increase Environmental Security
Environmental Security Listed First in UNDP's 2009 Arab Human Development Report
Gimcheon, South Korea to Create a Global Climate Change Situation Room

INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS

The Convention on Cluster Munitions Enters into Force on August 1, 2010
Assessment and Potential Revision of Resolution 1540 on Preventing WMD Terrorism
UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty
Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties
Belgian Senate to Consider Nuclear-Weapon Ban
Changes to War Crimes Proposed for the International Criminal Court
Increased Calls for Banning Nonlethal Riot-control Agents

CONFLICT AND POST-CONFLICT ENVIRONMENTAL SECURITY ISSUES

UN Mission Assessment of Gaza Conflict Included Environmental Impacts
New Legal Proceeding over Allegations of Use of Illegal Weapons in Iraq
Protecting the environment during armed conflict. An inventory and analysis of international law

NATIONAL AND REGIONAL INITIATIVES AFFECTING MILITARY ACTIVITIES

First U.S. National Health Security Plan Released
Jordan Armed Forces Upgrade, Part of Global Warming Debate
Iran and Qatar Sign Environmental MOU
Morocco Adopts First National Earth Charter in the Arab World and Africa
Russia to Boost Its Space Security Program
UN Economic Commission for Europe Adopts Electric and Hybrid Vehicle Regulations
Spain Promotes European Common Strategy on Electric Cars
China to Create an Emergency Environmental Management System
Tuvalu to use only renewable energy by 2020
Thailand, Other Asian Countries, May Tighten Environmental Regulations

TECHNOLOGICAL BREAKTHROUGHS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

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

B. Preventing or Responding to Environmentally Caused Conflicts

SECURITY IMPLICATIONS OF ENVIRONMENTAL ASPECTS

- Climate Change Threats Increasingly Top Security Agendas
- Seven Tipping Elements That Could Transform the Planetary Systems
- The Haiti Earthquake Disaster Could Stimulate Improved Resilience Planning
- Environmental Performance Index 2010 Score Worse for Vulnerable States
- Monopoly over Rare Earth Elements Raises Security and Environmental Concerns
- Yemen's Internal Conflicts Are Water-Induced
- Reports addressing the Link between Climate Change and Conflict
- State of the World 2010* Calls for a New Paradigm in Addressing Security
- Arctic Debate

NATURAL DISASTERS AND SCIENTIFIC EVIDENCES

- Scientific Evidences and Potential Consequences of Climate Change
- Other Natural Disasters

MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES

- Climate Refugees Trends

RISING SEA LEVELS

- Scientific Evidences and Potential Consequences

MELTING SEA ICE AND GLACCIERS

- Scientific Evidences and Potential Consequences

FOOD AND FRESHWATER

- Food and Freshwater Scarcity Issues
- Water to be Considered Integral Part to Copenhagen Negotiations
- Water Management Is the Main Aspect of Water Security Issues
- Nile Basin Controversies Continue
- Joint Afro-Arab Strategy for Addressing Agricultural Development and Food Security

HEALTH

- CDC launches the National Environmental Public Health Tracking Network
- Study Shows Deforestation Brings Malaria Epidemics
- Climate Change Consequences, Trends, and Actions

ENERGY SECURITY

Energy Security Challenges for the 21st Century
Energy Security Central to China's Energy Plan

PREVENTION AND ADAPTATION

New Flood Center to Develop Warning Systems
Global and Regional Initiatives

CLIMATE MODELING AND SCENARIOS

Climate Projection Models
Scenarios

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 JULY 2008

Aquatic Environment

European Transboundary Guidance on Water and Adaptation to Climate Change
EPA Issues New Regulations on Water Pollution from Construction
UN Treaty on Maritime Goods Transportation Opened for Signature
Work Plan for Reducing Greenhouse Gas Emissions from Ships

Chemicals and other Hazardous Compounds

Kiev Protocol to Aarhus Convention Enters into Force in October 2009
Two New Pesticides Added to the Rotterdam Convention on the Prior Informed Consent (PIC) Watch List
EU Restrictions on Nanofoods Expected to Pass in July

Energy

International Renewable Energy Agency Statute Enters into Force on 8 July 2010

Pollution

EPA Proposes Tougher Air-Quality Rules

Waste Management

Waste Reduction and Recycling Regulations and Laws Spreading Around the World
India Further Loosens Already Lax Rules on Waste Importing

PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES

Aquatic Environment

Increased Protection Needed for the Marine Environment
Proliferation of Sensors in and on Oceans Requires an International Legal Framework, but
Might Affect Freedom to Conduct Ocean Research
Better Planning Needed for Maritime, Especially Coastal, Areas

Factors to Consider in Establishing and Operating Marine Protected Areas
EPA Plan for Reducing Ship Emissions

Biodiversity

International Body to Monitor Biodiversity Destruction
New Measures to Continue the Fight against Biodiversity Loss
International Year of Biodiversity is 2010 and Convention on Biological Diversity COP10 to Meet in Japan This Year
Scientists Say Dolphins Should Be Treated As 'Non-Human Persons'

Chemical and Biological Safety

First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination
Preparations for a Legally Binding Global Instrument on Mercury Advance
Biosafety Protocol Advances
Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons
No Enforcement Mechanism Proposed for Strengthening the Bioweapons Treaty Due to “rapidly changing nature” of the Threat
Chemicals Management to Address Emerging Technologies-related Issues
Chemicals Regulatory Regime might be adjusted to Include Nanomaterials
International Gene Synthesis Consortium Created for Increasing Biosecurity
Asian Countries to Adapt their Chemicals Regulatory Systems to EU REACH System
U.S. to Revise the Toxic Substances Control Act
U.S. New Measures on Chemicals Safety
California Proposes Reducing the Level of Chromium 6 in Water
Toxic Compound Detected in Chlorinated Tap Water
New Evidence on Silver Toxicity
Environmental Effects from Flame Retardant Manufacturing Impurities
Ultrathin Solar Panels Could End Up On the EU list of Hazardous Materials, Due to Cadmium Content
Increasing Advocacy for BPA Restrictions
Building Contaminants Linked to Parking Lots with Coal Tar Sealant
Organophosphate Flame Retardants May Pose Health Risk

Greenhouse Gas Emissions

Post-Kyoto Protocol and Post-Copenhagen Negotiations
Reducing GHG Emissions Using the Montreal Protocol and other Regulatory Systems
Draft International Standards for Measuring Greenhouse Gas Emissions for Cities
EU Potential New Measures For Reducing CO₂ Emissions
France Proposes Carbon Tax Across EU and on Imports
China and U.S. Announce Climate Change Goals
British Group Outlines Plan for Zero Emissions by 2030

New Technologies

New Regulations Needed for Emerging New Technologies
Geo-engineering Promises/Threatens

Nanotechnology
Biotechnology
Computer Technology and Cyberspace
Space Technology

Nuclear Safety

Nuclear Nonproliferation Treaty Review Conference Adopted Document for Reducing Nuclear Threat
IAEA Database Recorded 1,562 Nuclear Trafficking Incidents for the Period 1993–2008
Advancements on Denuclearization
Dialogues for Creating a Northeast Asia Nuclear Weapon-Free Zone

Waste Management

Renewed Calls for Strengthening E-Waste Management Regulations
Organized Crime Targets Electronic Waste Recycling
Hazardous Waste Disposal of Increasing Concern
European Commission to Strengthen Bio-Waste Management
Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and Toxic Waste Threat

IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS

EU to Introduce New Environmental Index
European Commission Creates New Directorate-General for Climate Action
European Agency for the Cooperation of Energy Regulators to Become Operational in March 2011
UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty
New Measure to Enforce Maritime Environmental Protection
Observation and Information System for the World's Oceans to be Created
Consumer's Handbook for Reducing Solid Waste
Summary of European Battery Regulations Released
World Bank Development Indicators Database Available Free

INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

More than 30 New International Food Safety Standards Adopted
Software Standards to Connect Data Globally
Emerging International Packaging Standards to Reduce Environmental Footprints
Only Very Low-Energy Buildings to Be Built in EU after 2020

POLLUTION

The Oil Spill Likely to Initiate International Regulations Discussions and Accelerate Alternative Energy Developments
EPA Warnings on Various Potential Health Hazards
Studies Show Increased Hazards from Some Types of Airborne Particles
Study Reveals Extensive Danger from Lead in Foreign Paints
Low-fume Paint Requirements Spread
European Environment Agency Draws First Map of Europe's Noise Exposure
Greenhouse Gas Emissions Increase Ocean Noise Pollution

1. ENVIRONMENTAL SECURITY MONTHLY SCANNING ITEMS

A. Preventing or repairing military damage to the environment

ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA

Pentagon’s Quadrennial Defense Review Addresses Climate Change

The Pentagon’s Quadrennial Defense Review (QDR) is specifying for the first time climate change as a key issue “that will play a significant role in shaping the future security environment.” It addresses both ways that climate change would affect DoD: as a potential source of conflict, therefore shaping its “operating environment, roles, and missions,” and the impacts it would have on facilities and military capabilities. It notes, “While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world.” Therefore it suggests proactive engagement for capacity building mainly. “...with countries where the military is the only institution with the capacity to respond to a large-scale natural disaster.” As for facilities and military capabilities, it recommends, “a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required.” Future challenges, “...include managing uncertainty about the future environment and science and technology (S&T) trends.” [February 2010. Military Implications, Sources¹]

UNEP Year Book 2010 Addresses ‘warfare ecology’

UNEP Year Book 2010 presents the latest developments and scientific insights in UNEP’s six thematic priorities: environmental governance; the state of ecosystems and related management challenges; harmful substances and hazardous waste management; effects of climate change; disasters and conflicts; and use of resources. The report underlines, “In 2009, progress was made towards understanding how climate change, environmental degradation, and mismanagement of natural resources increase vulnerability to both disasters and conflicts—and how sustainable natural resource management may reduce vulnerability to disasters and conflict while supporting peacebuilding.” A subchapter is dedicated to ‘warfare ecology’, assessing ways to reduce the effects of conflicts on the environment. It suggests the need “...to incorporate ecosystem protection measures into weapons manufacturing,” and all phases of tactical planning, noting, “In the second half of the 20th century, more than 90 per cent of major armed conflicts took place in countries that contained biodiversity hotspots and more than 80 per cent occurred directly within a hotspot area”, therefore threatening biodiversity. Highlighting the role of preparedness and adaptation to reduce the risk of conflict as an effect of natural disasters, it mentions the IPCC report to come out in 2011 that will look specifically at synergies between disaster risk reduction and climate change adaptation: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. [February 2010. Military Implications, Source²]

UN Panel Meeting on World Water Day to Discuss How to Avoid Water Wars

The UN General Assembly held a high-level dialogue on World Water Day with three panels on: water related to the Millennium Development Goals; water, climate change and disasters; and water and peace and security. Since potential water wars could be triggered by combinations of climate change, population growth, rapid urbanization, and increasing inequalities between those who could and could not cope with water scarcity, several participants suggested that greater efforts by the international community to promote dialogues for equitable and sustainable use and management of transboundary rivers, lakes and aquifers are needed. It was also suggested that water issues be included on the agenda of the next session of the Conference of Parties (COP16) of the UNFCCC, to be held in Mexico at the end of the year, and that 2012 be declared the International Year of Water Diplomacy.

More people now die from contaminated and polluted water than from all forms of violence, including wars, notes the UNEP report, *Sick Water?* Some two million tons of waste, estimated to equal two or more billion tons of wastewater, is being discharged daily into rivers and seas, harming key ecosystems and human health. The report underlines the need for global and comprehensive water-related regulations and enforcement mechanisms, including international standards and guidelines for water and ecosystem quality management. [March 2010. Military Implications, Sources³]

Including Security Implications of Climate Change on the Copenhagen Agenda

The second conference “Climate Change & Security at Copenhagen: New Thinking on the Atlantic Contribution to Success” to be held October 7-8, 2009 in Brussels, will focus on the security aspects of climate change and trans-Atlantic co-operation, as inputs for the Copenhagen conference. [August 2009. Military Implications, Source⁴]

G8 and G20 Integrate Security and Environmental Issues in Development

The G8 meeting held in Muskoka, Canada, declared that: “We must also ensure that the proliferation of weapons of mass destruction, terrorism and organized crime, as well as many other challenges faced by states to address their security vulnerabilities, including climate change, remain at the forefront of public policy.” The G8 reiterated the goal of reducing global greenhouse gas emissions at least 50% by 2050, with developed countries reducing in aggregate by at least 80% compared to 1990 or more recent years.

The G8 was followed by the first Summit of the G20 in its capacity as the premier forum for international economic cooperation. The G20 addressed cooperation strategies for finding global solutions to transnational problems, such as the effects of climate change, food and energy security. A Working Group on Development was established to suggest a development strategy to be adopted at the Seoul Summit to be held November 11-12, 2010. However, critics say that the Toronto Declaration was watered down, not containing specific commitments to clean energy and phase-out subsidies of fossil fuels. [June 2010. Military Implications, Sources⁵]

Environmental Courts and Tribunals Are Rapidly Increasing Around the World

According to an international study by the World Resources Institute (WRI), there are about 350 environmental courts in 41 countries. About half of them were created over the last five years, increasing public access to environment-specialized legal systems. The increasing number of

courts dedicated to environmental issues should lead to accelerated changes in environmental lawsuits, creating precedents around the world. It reinforces the trends toward improved enforcement and applications of the “polluter pays” principle. [April 2010. Military Implications, Sources⁶]

International Lawsuits for Environmental Crime Proliferate

International lawsuits for environmental crimes are increasing, including those based on damages due to climate change, which is a new phase in the international environmental legal system. For example, Micronesia filed a case with the Czech Environment Ministry against the extension of the Prunerov, CEZ’s largest coal-powered generator, on grounds of potential increase of CO₂ emissions with subsequent consequences to global warming and rising sea levels. Consequently, the Czech government ordered an international assessment of the project. Another example is Kivalina, an Inupiat Eskimo village on a barrier island north of the Arctic Circle. It has created a case against a group of fuel and utility companies (including ExxonMobil and Shell Oil) for their contribution to climate change that is accelerating the island’s erosion. A third example is four Nigerian farmers and Friends of the Earth Netherlands who filed a pollution lawsuit in the Netherlands against Royal Dutch Shell for environmental degradation caused in Nigeria. In a related activity, Bolivia’s President Evo Morales is organizing an international conference April 20-22, 2010 in Cochabamba to explore creation of an international court on environmental crimes and a “universal proposal for the rights of mother earth.” Government officials, indigenous people, other social movement representatives, environmentalists, and scientists will be invited. [January 2010. Military Implications, Sources⁷]

New Approach to Environmental Crime

Eco-Crime and Justice: Essays on Environmental Crime is a collection of four essays detailing the multidisciplinary application of criminology to environmental harm. The papers examine how environmental crimes, including illegal wildlife trade, timber trafficking, and hazardous waste dumping, represent some of the fastest growing, most profitable, and poorly enforced illegal activities perpetrated by both international corporations and organized crime. Claiming that states and territories’ very existence is threatened by climate change and that environmental harm disproportionately afflicts developing nations, the poor, and minorities, the essays demand a new perspective. The approach proposed, called eco-global criminology, proposes integrating local wisdom with expert solutions to these borderless ailments, using tailored policing based on multilateral treaties and law enforcement. [May 2010. Military Implications, Sources⁸]

OSCE is Enhancing Environmental Security in Central Asia

The OSCE continued its commitment to further environmental security in Central Asia during a meeting held June 23, 2010, among the OSCE Chairperson-in-Office, Kazakhstan’s Secretary of State and Foreign Minister Kanat Saudabayev, President of Turkmenistan Gurbanguly Berdimukhammedov, and other senior officials. In addition to exploring ways to improve environmental security in the region, they also discussed the related security issues in Kyrgyzstan and Afghanistan. Following the meetings Saudabayev said: “The Kazakh OSCE Chairmanship is committed to preventing escalation of tensions in Kyrgyzstan, and is ready to help the country with post-conflict rehabilitation. The OSCE is working together with the international community to help Kyrgyzstan.” The next day’s high-level international conference

on disarmament in Central Asia and the Caspian region, held also under the auspices of the OSCE, expanded the discussions to potential strategies for making Central Asia a zone free of weapons of mass destruction (including nuclear), strengthening nuclear security in Central Asian states (counter transit of nuclear materials by terrorists), safe transportation of energy resources, and the Caspian Sea border delimitation disputes. These issues will be further discussed at an informal meeting of OSCE Foreign Ministers in Almaty, July 16-17, 2010. [Related items: *First EU-Central Asia Security Forum Included Environmental Security* in September 2008, *ENVSEC to Expand Environmental Co-operation in South Caucasus*, in March 2009 environmental security reports.] [June 2010. Military Implications, Sources⁹]

East Africa to Increase Environmental Security

The East African Community (EAC) conference, 'Peace and Security for Stability and Development,' held in Kampala, Uganda, October 5–7, 2009 explored the issues and impacts of globalization and climatic change on the region. It recommended the creation of a regional standby force that would provide collective protection of EAC's natural resources (land and marine), as well as the unified airspace. It would have active and reserve contingents, and would be different from the Brigades established by the African Union. The Implementation Plan for the EAC Regional Strategy for Peace and Security addresses broad human security concerns, including population growth, socio-political and economic security issues, and global warming. Along the same lines, the Annual Regional Parliamentary Forum on Environmental Security in Eastern Africa, held October 13–14, also in Uganda, discussed security implications of environmental challenges facing Africa, as well as environmental crime and its trans-boundary manageability. The recommendations to parliamentarians include initiating policy reforms and legislation, as well as establishing monitoring systems for environmental security related issues. [October 2009. Military Implications, Sources¹⁰]

Environmental Security Listed First in UNDP's 2009 Arab Human Development Report

The "Arab Human Development Report 2009" by UNDP underlines that the region's security faces growing challenges from environmental stresses. It argues that human security will be adequately addressed only if all the seven interdependent threats identified are dealt with simultaneously and equally. Out of seven dimensions of threat, "People and their insecure environment" is listed first, as "The Arab region faces growing challenges to the security of its population from environmental stresses. [...] challenges will result from population and demographic pressures, the overexploitation of land, water shortages, desertification, pollution, and climate change." Amat Al Alim Alsoswa, Director of the UNDP Regional Bureau for Arab States and UN Assistant Secretary-General pointed out, "The human security of people in the Arab region depends, first and foremost, on the health of the environment that sustains all of us." [July 2009. Military Implications, Sources¹¹]

Gimcheon, South Korea to Create a Global Climate Change Situation Room

On August 19, 2009, the City of Gimcheon, South Korea, announced that it will establish a global climate change situation room. The Millennium Project has agreed to provide the collective intelligence system based on the GENIS model (Global Energy Network and Information System) with additions for climate science, adaptation, and mitigation. Collaboration will be sought with related efforts such the War Room on Climate Change

proposed by Richard Branson (see *Branson calls for War Room on Climate Change at the United Nations* in February 2008 environmental security report.) [August 2009. Military Implications, Sources¹²]

INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS

The Convention on Cluster Munitions Enters into Force on August 1, 2010

The Convention on Cluster Munitions received the 30th ratification and thus will enter into force on August 1, 2010, two years after its adoption in May 2008. The Convention bans the use, production, and transfer of cluster munitions, and sets deadlines for stockpile destruction and clearance of contaminated land, as well as prescribing responsibilities towards affected communities. The Oslo process, based on close collaboration among governments, civil society (led by the Cluster Munitions Coalition), the International Committee of the Red Cross, as well as UN agencies, set a precedent on how a “coalition of the willing” can successfully lead to international regulations. As of February 16, 2010, 30 countries ratified and 104 signed the convention (see detailed list of States Parties in the Appendix.) The first meeting of States Parties is scheduled for November, to be held in Lao People’s Democratic Republic. [Related item: *The Cluster Munitions Treaty Signed by 94 Nations* in December 2008 environmental security report.] [February 2010. Military Implications, Sources¹⁴]

Assessment and Potential Revision of Resolution 1540 on Preventing WMD Terrorism

The UN Security Council’s 1540 Committee conducted a three-day review meeting of Resolution 1540 (that requires states to take steps to prevent terrorists from acquiring chemical, biological, radiological and nuclear weapons) to assess the evolution of risks and threats, and to address implementation aspects. Issues identified include: lack of capacity-building tools and criteria for evaluation, geographical gaps, and compatibility differences of national systems, as well as potential weaknesses at the international level. Some delegates argued that the resolution did not have the same power and impact as a convention, therefore legislations are not 1540-specific, and cannot be used for prosecutions. The Committee hopes to prepare a report on collaborative anti-WMD strategies by the end of 2009, said panel head, Jorge Urbina, Costa Rican ambassador to the UN. [Related item: *Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction* in July-August 2008 environmental security report.] [October 2009. Military Implications, Source¹⁵]

UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty

The UN Security Council endorsed a resolution aiming to advance global nuclear disarmament. Measures include: discouraging withdrawal from the Nuclear Nonproliferation Treaty, increasing membership in the Comprehensive Nuclear Test Ban Treaty, and creating additional nuclear weapon-free zones. Non-compliance with the Nuclear Nonproliferation Treaty would be referred directly to the Security Council for possible punitive action, rather than to the International Atomic Energy Agency. [September 2009. Military Implications, Sources¹⁶]

Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties

With the entry into force of the Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, nuclear weapons will be banned throughout the entire Southern Hemisphere. The Treaty requires the establishment of an African Commission on Nuclear Energy to implement the agreement and to promote cooperation for the peaceful uses of nuclear science, and stipulates procedures by which the African Union could refer non-compliance cases to the UN Security Council. The other regional agreements banning nuclear weapons in their area are: the 1959 Antarctic Treaty, the 1967 Treaty of Tlatelolco (for Latin America and the Caribbean), the 1985 Treaty of Rarotonga (for the South Pacific), the 1995 Treaty of Bangkok (for Southeast Asia), and the 2006 Treaty of Semipalatinsk (for Central Asia). [August 2009. Military Implications, Sources¹⁷]

Belgian Senate to Consider Nuclear-Weapon Ban

A bill submitted to the Belgian Senate on October 15, 2009, is proposing a ban in Belgium on the manufacturing, fixing, sale, shipping, and possession of nuclear arms. Deliberations will take at least until May 2010. Belgium has already banned cluster and depleted uranium munitions. [October 2009. Military Implications, Sources¹⁸]

Changes to War Crimes Proposed for the International Criminal Court

The 8th session of the Assembly of States Parties to the International Criminal Court discussed proposals to amend the Rome Statute. Belgium proposed modifying Article 8 to cover use of certain weapons (chemicals, gases, and certain bullets) for international and non-international conflict situations and expanding the list of war crimes to include use of chemical, biological, and some conventional weapons, and anti-personnel mines. These proposals are considered relatively non-controversial so as not to deter non-parties from ratifying the Rome Statute and to be consistent with other multilateral agreements in force and with international customary law. Mexico proposed adding the employment or the threat to employ nuclear weapons to article 8. The Netherlands proposed inclusion of Crime of Terrorism under Article 5: Crimes within the jurisdiction of the Court. The first Review Conference on the Rome Statute will be held May 31-June 11, 2010, in Kampala, Uganda. [November 2010. Military Implications, Sources¹⁹]

Increased Calls for Banning Nonlethal Riot-control Agents

Should advances in non-lethal riot control agents be considered in the Chemical Weapons Convention (CWC)? Currently, the Chemical Weapons Convention and its enforcement mechanisms do not apply to non-lethal riot control agents, incapacitants, and certain munitions containing chemical agents. The nature of the global chemical industry and chemical warfare materials are evolving outside international regulations. A report, *Dangerous Ambiguities: Regulation of Riot Control Agents and Incapacitants under the Chemical Weapons Convention* by Michael Crowley of the University of Bradford Non-Lethal Weapons Research Project documents these problems. It notes that the danger of “misuse of riot control agents by law enforcement officials, military personnel and private military company employees” grows exponentially as research on these agents proliferates around the world. The report recommends that the next (third) CWC review conference, scheduled for 2013, considers clarifying ambiguities that undermine effective enforcement of the Convention with regard to such weapons and, in the meantime, adopt a moratorium on weaponization of incapacitants. Some

states, led by Switzerland, show an increased interest in discussing a legal framework for incapacitants. [November 2009. Military Implications, Sources²⁰]

CONFLICT AND POST-CONFLICT ENVIRONMENTAL SECURITY ISSUES

UN Mission Assessment of Gaza Conflict Included Environmental Impacts

The UN Mission assessment of the December 2008–January 2009 Gaza conflict found evidence that both Israeli forces and Palestinian militants committed actions that could be violations of international law. The 575-page report, “Human Rights in Palestine and Other Occupied Arab Territories; Report of the United Nations Fact Finding Mission on the Gaza Conflict,” includes impacts on the environment and public health. The Mission assessed particularly the use of white phosphorous, fléchette missiles, DIME (dense inert metal explosive) munitions, and depleted uranium. The Mission “...believes that serious consideration should be given to banning the use of white phosphorous in built-up areas” (par. 897). Similarly, it notes that DIME weapons injuries might raise the risk of cancer (par. 904). The report recommended further environmental monitoring under UN auspices and underlined that a detailed environmental impact assessment is being conducted by UNEP [September 2009, Military Implications, Sources²¹]

New Legal Proceeding over Allegations of Use of Illegal Weapons in Iraq

The UK Ministry of Defence began investigations over allegations that Britain was complicit in the use of chemical weapons in the 2004 attack against Fallujah, Iraq. The increased number of child deformities, miscarriages, and cancers might be linked to the alleged use of weapons including white phosphorus, a modern equivalent of napalm, and depleted uranium by the coalition forces. Affected Iraqi families initiated legal actions against the UK Government for breaching international law, war crimes, and failing to intervene to prevent a war crime. [May 2010. Military Implications, Source²²]

Protecting the environment during armed conflict. An inventory and analysis of international law

Protecting the environment during armed conflict. An inventory and analysis of international law report by UNEP is a comprehensive overview of existing legislation protecting the environment in case of conflict and gaps and areas that should, but are not yet, covered by regulations. The report notes that there are no mechanisms to protect natural resources during armed conflict, and no permanent international authority to monitor violations and address liability and redress claims for environmental damage caused during armed conflicts. There are also terminology issues, such as lack of clear definition for “widespread,” “longlasting,” and “severe”, as well as a standard definition of what constitutes a “conflict resource” or their illegal exploitation and trade. While the majority of international legal provisions protecting the environment during armed conflict—including the ICRC Guidelines on the Protection of the Environment during Armed Conflict (1994)—were designed for international armed conflicts, the majority of today’s conflicts are internal; hence the legal instruments do not apply. The report recommends, inter alia, that the Permanent Court of Arbitration and its “Optional Rules for Conciliation of Disputes Relating to the Environment and/or Natural Resources” should be

considered to address disputes related to environmental damage during armed conflict. It concludes that “A summary report on the environmental impacts of armed conflicts should be presented on an annual basis to the UN General Assembly, in conjunction with the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict.” [January 2010. Military Implications, Sources²³]

NATIONAL AND REGIONAL INITIATIVES AFFECTING MILITARY ACTIVITIES

First U.S. National Health Security Plan Released

The U.S. Health and Human Services Department released the first National Health Security Strategy for the event of a bioterrorism incident or other large-scale health crisis. The strategy outlines objectives for different government areas and for nongovernmental groups to focus on over the next four years, and recommends a review of the national countermeasure system. [Related item: *Global Influenza Pandemic Declared* in June 2009 environmental security report.] [January 2010. Military Implications²⁴]

Jordan Armed Forces Upgrade, Part of Global Warming Debate

Jordan is the only developing country that included upgrading military energy efficiency in its greenhouse emissions reduction plan submitted to the UN as per the Copenhagen agreement. The government in Amman stated that its armed forces would seek to upgrade equipment and use energy saving technologies by 2020. [February 2010. Military Implications, Sources²⁵]

Iran and Qatar Sign Environmental MOU

Qatar and Iran have signed a memorandum of understanding regarding preservation of the environment. The agreement covers managing green reserves and various flora and fauna aspects, as well as the environmental management of coastal areas, desertification control, and know-how exchange. Qatar has already undertaken several environmental projects, including a green convention center in Doha and an agreement between the Doha Bank and UNESCO to "Green the Middle East". [March 2010. Military Implications, Source²⁶]

Morocco Adopts First National Earth Charter in the Arab World and Africa

The National Charter for Environment and Sustainable Development adopted by the Kingdom of Morocco represents the first such commitment in Africa and the Arab World. The Charter sets a framework for future regulations for natural resources, the environment, and sustainability policy. It was launched at the celebration of Earth Day's 40th anniversary, April 22, 2010. [April 2010. Military Implications, Sources²⁷]

Russia to Boost Its Space Security Program

Reportedly, participants in the Russian State Duma hearings on planetary security stated that it was time for Russia to supplement its national space program with the study of the asteroid hazard and possible ways to protect the Earth. [In March 2009 an asteroid missed Earth by 77,000 kilometers, 80% closer to the planet than our moon is. If it had hit Earth, it would have

wiped out all life on 800 square kilometers. No one knew it was coming.] Asteroid-comet hazard and international legal aspects of counteracting the impact hazard were also on the agenda of the ‘Asteroid-Comet Hazard-2009’ conference held September 21-25, 2009, in St. Petersburg (proceedings to be available on November 6). NASA already has a Near-Earth Object Program Office, and Italy and Spain cooperate on NEODYS (Near Earth Objects Dynamic Site). Meantime, Roscosmos (the Russian Federal Space Agency) announced plans to design by 2012 a nuclear-powered spacecraft, to be ready for a manned mission after 2021. [Related items: *Steps for an International Regime for Space Debris and Space Traffic Control System* in May 2009 environmental security report.] [October 2009. Military Implications, Sources²⁸]

UN Economic Commission for Europe Adopts Electric and Hybrid Vehicle Regulations

The UN Economic Commission for Europe (UNECE) adopted the first international technical regulation on safety for fully electric and hybrid cars, within the 1958 UNECE framework. The Regulation will ensure that cars with a high voltage electric power train, such as hybrid and fully electric vehicles, are as safe as conventional cars. These standards on manufacturing and marketing are expected to increase sales and will apply not only in the EU, but in a number of other markets, such as South Korea, Japan, and Russia. Mutual recognition of approvals among contracting parties of the 1958 agreement will be possible as soon as the Regulation is applied. [March 2010. Military Implications, Source²⁹]

Spain Promotes European Common Strategy on Electric Cars

A February 9th meeting of EU industry ministers focused on plans to establish a common strategy for electric cars. Spain, the strongest promoter of the plan, suggests that the electric car be included in EU’s 2020 agenda and is pushing the European Commission to adopt a common strategy. Germany also supports the idea. Nevertheless, environmental-protection NGOs warn that unless developed in concordance with “smart” power grids, large-scale use of electric cars could be counterproductive to reducing CO2 emissions. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.] [February 2010. Military Implications, Source³⁰]

China to Create an Emergency Environmental Management System

China’s Vice Minister of Environmental Protection, Zhang Lijun, announced that one of the ministry’s priorities for 2010 is the creation of an environmental management system for addressing pollution and its effects. Reportedly, “environmental protection authorities at all levels should focus on the handling of mass disturbances triggered by environmental pollution such as water and soil pollution, and reduce the harm that pollution bring to people as much as possible.” A two-year nationwide campaign will be conducted to investigate all pollution-related threats, “which will gradually form a dynamic environmental management system,” says Zhang. [December 2009. Military Implications, Source³¹]

Tuvalu to use only renewable energy by 2020

Tuvalu, one of the small island states threatened by disappearance due to rising sea levels, has set a goal to use 100% renewable energy by 2020. It estimates that shifting exclusively to wind and solar power would cost a little over \$20 million. Following Maldives, Tuvalu is the second

country intending to set an example to nations responsible for large greenhouse gas emissions ahead of the Copenhagen negotiations. “We look forward to the day when our nation offers an example to all — powered entirely by natural resources such as the sun and the wind,” said Kausea Natano, Minister for Public Utilities and Industries. [July 2009. Military Implications, Source³²]

Thailand, Other Asian Countries, May Tighten Environmental Regulations

A Thai court has sided with the country’s growing green movement and suspended \$12 billion in industrial investments until their environmental impacts can be properly assessed. The government hopes to set up a new environmental monitoring agency within five months to quickly assess and approve new projects. Environmental activists have similarly increased their pressures in Indonesia, Vietnam, and China over the past few years. [March 2010. Military Implications, Sources³³]

TECHNOLOGICAL BREAKTHROUGHS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

Computer Technology and Robotics

Network of Autonomous Robots Monitors Difficult Environments

A NASA project recently tested the concept of a network of rugged, autonomous, environment-sensing “spiderbots” that can be placed into a hazardous environment (in this trial, dropped into Mount St. Helens) to communicate among themselves and with the outside world, including satellites, to monitor an environmental situation. The network bypasses inoperative nodes and can command satellites to provide additional coverage. The principal investigator is Prof. WenZhan Song of the School of Engineering and Computer Science, Washington State University. [August 2009. Military Implications, Source³⁵]

New Detection and Cleanup Techniques

[Assessment of Fine Dust Composition Method](#)
[Microcantilevers Provide Ultrasensitive Detection](#)
[New Color Matrix Sensor Array Warns of Toxic Gases](#)
[Silicon-on-insulator Microring Resonator Provides High Sensitivity Gas Detection](#)
[New Material Will Aid Radioactive Cleanup](#)
[Genetically Engineered Bacteria Might Provide Landmine Detection](#)
[Chemical Vapor Deposition Creates Nano Filters, Catalyst Scaffolds](#)
[Review and Map of Use of Nanomaterials for Environmental Cleanup](#)
[Nanotechnology Applications for Clean Water](#)
[Nanotube-impregnated Paper Provides Sensitive Biosensor for Aqueous Toxins](#)
[Water decontamination improved with gallium](#)
[New Ultra-sensitive Detector for Water-borne Hazards](#)
[New Water Purifying Filter Requires No Energy or Running Water](#)

[Ozone Bubbles Provide New Cleansing Technique](#)
[New Catalyst Removes Nitrite and Nitrate from Drinking Water](#)
[New Nature-based Filter Allows Utilization of Gray Water](#)
[Inverse Fluidization of Aerogels Removes Oil from Water](#)
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Assessment of Fine Dust Composition Method

A project managed by Dr. Cord Fricke-Begemann at the Fraunhofer Institute for Laser Technology in Aachen, Germany, has developed a new technique for analyzing by particle size the components of fine dust (< 100 nm) such as may be generated by industrial processes. According to a story in Nanowerk News, “a gas stream separates the particles into size classes before they are collected on filters. Their composition is then examined by means of laser emission spectroscopy.” Results can be obtained in less than 20 minutes. [October 2009. Military Implications, Source³⁷]

Microcantilevers Provide Ultrasensitive Detection

A tuned-microcantilever-based chemical sensor that is far more sensitive than current devices has been developed by a team led by Panos Datskos, of the Oak Ridge National Laboratory's Nanosystems & Structures Group. The researchers believe that the technology could be incorporated into a handheld instrument and therefore could be used for environmental assessment. [February 2010. Military Implications, Source³⁸]

New Color Matrix Sensor Array Warns of Toxic Gases

As part of the NIH Genes, Environment and Health Initiative, Prof. Kenneth S. Suslick and colleagues at the University of Illinois at Urbana-Champaign have developed what they characterize as an ‘optoelectronic nose.’ The system uses a postage stamp-sized 6×5 array of sensor dots, each of which signals the presence of one or more particular toxins by changing color. According to Prof. Suslick, “The pattern of the color change[s in the whole array] is a unique molecular fingerprint for any toxic gas and also tells us its concentration. By comparing that pattern to a library of color fingerprints, we can identify and quantify the TICs in a matter of seconds.” Tests were run on a set of 19 toxic industrial chemicals. [September 2009. Military Implications, Sources³⁹]

Silicon-on-insulator Microring Resonator Provides High Sensitivity Gas Detection

According to an article in Nanowerk News, INTEC, imec’s associated laboratory at Ghent University in Belgium, has developed a technique using coated SOI microring resonators with films of 3.5 nm ZnO nanocrystals to achieve optical sensing of gaseous ethanol. Ethanol vapor concentrations as low as 100 ppm have been detected. The devices can be modified for the detection of other gases. [June 2010. Military Implications, Source⁴⁰]

New Material Will Aid Radioactive Cleanup

Mercouri Kanatzidis, at the Argonne National Laboratory, and Nan Ding, a chemist at Northwestern University, report developing a new material, composed of metal sulfides, that binds radioactive cesium isotope ions to sulfur atoms inside its crystalline structure, giving it the ability to aid clean-up at radioactively contaminated sites. [March 2010. Military Implications, Sources⁴¹]

Genetically Engineered Bacteria Might Provide Landmine Detection

Alistair Elfick, of the University of Edinburgh's Centre for Biomedical Engineering, and his team have genetically modified E. coli bacteria to produce a protein in the cell membrane that senses TNT, one of the explosives used in landmines. The group introduced the gene for the luciferase enzyme, which produces light in fireflies. According to scidev.net, "When proteins on the surface of E. coli detect TNT, this 'switches on' the gene responsible for light production." [January 2010. Military Implications, Source⁴²]

Chemical Vapor Deposition Creates Nano Filters, Catalyst Scaffolds

According to a story in Nanowerk News, an international group of researchers, led by Robert Vajtai at Rice Univ., has developed a technique that uses chemical vapor deposition to form carbon nanotube membranes that "could find wide application as extra-fine air filters", removing "up to 99 percent of particulates with diameters of less than [1000 nm]", and "as scaffolds for catalysts that speed chemical reactions." [May 2010. Military Implications, Sources⁴³]

Review and Map of Use of Nanomaterials for Environmental Cleanup

According to the announcement, "A new review article ... co-authored by Dr. Todd Kuiken, a research associate for the Project on Emerging Nanotechnologies (PEN), focuses on the use of nanomaterials for environmental cleanup. It provides an overview of current practices; research findings; societal issues; potential environment, health, and safety implications; and possible future directions for nanoremediation." The Wilson Center/Pew Trust's PEN also released a map that "shows which nanomaterials have been used where and includes detailed information on the contaminants treated and the nature of the treatment." [July 2009. Military Implications, Sources⁴⁴]

Nanotechnology Applications for Clean Water

Elsevier advertises, "Nanotechnology Applications for Clean Water highlights both the challenges and the opportunities for nanotechnology to positively influence ... [the] nanotechnology area of environmental protection. Here you will find detailed information on breakthroughs, cutting edge technologies, current research, and future trends that may affect acceptance of widespread applications. The first four parts of the book cover specific topics including using nanotechnology for clean drinking water in both large scale water treatment plants and in point-of-use systems [as well as] existing technologies and future potential for groundwater remediation, pollution prevention, and sensors. ... The final part discusses the

inherent societal implications that may affect acceptance of widespread applications." The book was not read/reviewed for this report. [July 2009. Military Implications, Sources⁴⁵]

Nanotube-impregnated Paper Provides Sensitive Biosensor for Aqueous Toxins

Prof. Nicholas Kotov, of the departments of Chemical Engineering, Materials Science and Engineering, and Biomedical Engineering at the University of Michigan, and associates from Jiangnan University, China, have developed a fast and inexpensive sensor for detecting toxins in water, using paper strips with several layers of single-walled carbon nanotube dispersion containing antibodies. The technique's sensitivity is high—comparable with such current biochemical techniques as enzyme immunoassay and mass-spectrometry—and reportedly more than 25 times faster. Kotov explains that "The change of electrical response [conductivity] of the paper reflects the contents of the analyte". [December 2009. Military Implications, Sources⁴⁶]

Genetically Engineered Tobacco Plant May Clear Polluted Water

Dr. Pascal M.W. Drake from the Centre for Infection at St. George's University of London and his team claim success in genetically engineering a strain of tobacco that produces an antibody to microcystin-LR (MC-LR), an environmental toxin pollutant produced by a species of cyanobacteria that makes water unsafe for human use. The authors claim that this plant could serve as a major tool for helping keep water sources safe to use, especially in developing nations. [March 2010. Military Implications, Sources⁴⁷]

Water decontamination improved with gallium

Researchers at Sandia National Laboratories have discovered that adding an atom of gallium to the key molecules in a coagulant widely used for water decontamination greatly improves its effectiveness and shelf life. [July 2009. Military Implications, Sources⁴⁸]

New Ultra-sensitive Detector for Water-borne Hazards

A new semiconducting-nanotube-based chip that reliably detects very low concentrations (ppb) in water of TNT or a chemical relative of sarin has been developed by researchers from the Dept. of Chemical Engineering at Stanford University. According to the principal investigator, Prof. Zhenan Bao, the new device "offers a rare combination of low-cost materials, low power usage, robust and repeatable performance in water, instant response and physical flexibility," and its technology is applicable to a wide variety of target compounds. [September 2009. Military Implications, Sources⁴⁹]

New Water Purifying Filter Requires No Energy or Running Water

Tata Chemicals, of Mumbai/Kolkata, India, has announced the release of 'Tata Swach', a water purifier unit that requires no energy or running water to operate. The unit uses a replaceable cartridge packed with a purification medium that kills bacteria and disease-causing organisms. The cartridge can purify up to 3000 liters of water, after which it stops water flow. [December 2009. Military Implications, Source⁵⁰]

Ozone Bubbles Provide New Cleansing Technique

A new technique uses ozone bubbles to turn hydrocarbon [oil] content in water or soil into a form that can be retained by sand filtration, which is a conventional and economical process. This new method has been developed by Prof. Andy Hong of the University of Utah, and is expected to be commercialized by Miracotech, Inc. of Albany CA. [December 2009. Military Implications, Source⁵¹]

New Catalyst Removes Nitrite and Nitrate from Drinking Water

Jitendra Kumar Chinthaginjala of the University of Twente, Netherlands, has developed a catalyst structure that can efficiently remove hazardous nitrite and nitrate, in combination with hydrogen, from drinking water, and turn it into harmless nitrogen. The system consists of nanoparticles of palladium or platinum attached to extremely fine threads of carbon, with the spaces between the threads allowing the nitrite and nitrate to come into good contact with the surface of the nanoparticles. [June 2010. Military Implications, Source⁵²]

New Nature-based Filter Allows Utilization of Gray Water

Prof. Robert D. Berghage of the Pennsylvania State Univ. and associates have developed a filter that converts gray water (from sinks, showers, and other non-pathogenic sources) to a form suitable for irrigation and similar uses. According to an item in physorg.com, the filter "consists of two plastic pipes filled with layers of porous rocks, soil, crumbs from discarded tires, composted cow manure and peat moss. Vegetables and other plants are planted in holes along the sides of the pipes. The pipes stand in a basin with still more plants -- papyrus and horsetail reed - - whose roots support microbes that remove pollutants." [May 2010. Military Implications, Source⁵³]

Water Treatment Technologies for the Removal of High-Toxicity Pollutants

"Water Treatment Technologies for the Removal of High-Toxicity Pollutants," part of the NATO Science for Peace and Security Series C: Environmental Security, presents the proceedings of the NATO Advanced Research Workshop with the same name, held September 13–17, 2008 in Košice, Slovak Republic. It is an overview of problems related to high toxicity pollutants in the environment, especially in drinking waters, some technologies for water treatment, as well as policy aspects for increasing environmental security. [December 2009. Military Implications, Source⁵⁴]

New Technique Helps Reduce Nanoparticle Wastewater Pollution

Scientists at the UK's Centre for Ecology & Hydrology have discovered that coating nanoparticles with a surfactant causes them to clump together and form a removable solid sludge when they appear in wastewater as a result of their use (now widespread) in commercial products, enabling them to be cleared from treatment plant effluent streams. [November 2009. Military Implications, Source⁵⁵]

Project Developing Sensors for Engineered Nanoparticles

According to Nanowerk News, Prof. Omowunmi Sadik, director of SUNY's Binghamton University Center for Advanced Sensors and Environmental Systems, is leading research on developing sensors that will detect and identify engineered nanoparticles. This should advance understanding of the risks associated with the environmental release and transformation of these particles, as well as naturally occurring cell particles. [March 2010, Military Implications, Source⁵⁶]

Variable Heating Provides New Flexibility for Gas Sensors

Researchers Barani Raman and associates at the US National Institute of Standards and Technology (NIST) have developed a new “sensitive detector technology capable of distinguishing hundreds of different chemical compounds with a pattern-recognition module that mimics the way animals recognize odors”, according to a NIST announcement. The current unit comprises eight types of sensors in the form of oxide films deposited on the surfaces of 16 microheaters that allow the sensors to be heated to 350 temperature points between 150°C and 500°C, and “relies on changes in electrical conductance in the sensing film to detect the presence of adsorbed gases. Temperature changes may be used to create response ‘fingerprints’ for different gases.” The new technology is better than previous devices at recognizing previously un-sensed compounds and at dealing with sensor wear over time. [November 2004. Military Implications, Source⁵⁷]

Counter Bioterrorism or Pandemic Technologies

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[Paper biosensors to detect toxins, pathogens, and viruses](#)
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Dirty Bomb Treatment Technology Developed in U.K.

Scientists in the UK have developed a suitcase-sized device that could help fast treatment of large numbers of people following exposure to a radiological ‘dirty bomb.’ The device could test 30 samples per hour, determining the level of cellular damage a person is suffering following exposure to radiation. [September 2009. Military Implications, Sources⁵⁸]

Paper biosensors to detect toxins, pathogens, and viruses

A team of Canadian researchers from McMaster University in Hamilton, Ontario reports developing a paper biosensor technology that would enable fast and cost-effective detection of harmful substances, including toxins, pathogens, and viruses. The system is similar to printers

using cartridges, but with two layers of “ink” (the first one comprising biocompatible silica nanoparticles, and a second containing an enzyme), which form a bio-ink that changes color upon contact with a specific biological agent. [July 2009. Military Implications, Sources⁵⁹]

Work Proceeds on Optical Fiber Detector for Bacterial Agents

Thomas Inzana, a bacteriologist at the Virginia-Maryland College of Veterinary Medicine at Virginia Tech, and his team have received a grant by NIH to continue their work on development of nanoscale optical fiber biosensor tests for detection of biological agents such as might be used in a terrorist attack. According to the story in Nanowerk News, “the optical fiber is coated with antibodies or DNA that will bind to antigens or DNA in the specimen. When this happens, the light that normally passes through the fiber will be decreased, indicating the presence of a biological agent.” [January 2010. Military Implications, Source⁶⁰]

New Polymer Fights Both Biological and Chemical Toxins.

A team led by Dr. Alan Russell of the McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh School of Medicine, claims synthesis of a single, multifunctional polymer material that can decontaminate both biological and chemical toxins, such as are used in weapons. According to an announcement, it comprises a “polyurethane fiber mesh containing enzymes that lead to the production of bromine or iodine, which kill bacteria, as well as chemicals that generate compounds that detoxify organophosphate nerve agents.” [March 2010. Military Implications, Source⁶¹]

Scanning Instrument for Chemical Agents Detection

Researchers at Queen’s University in Belfast, Northern Ireland, are developing a new sensor that has the potential to detect chemical agents within seconds. The system consists of special gel pads to collect samples from people or objects, and a scanning device (using Raman spectroscopy). Mixing the samples with nanoscale silver particles amplifies the signals of compounds, allowing detection of even very small traces of chemical agents. [October 2009. Military implications, Sources⁶²]

Ultrasensitive Sensor Could Detect Bacteria in Minutes

According to an article in MIT’s Technology Review, a new sensor developed by Benjamin Miller, professor of dermatology and biomedical engineering at the University of Rochester Medical Center, and associates, could be the basis for a portable instrument that could detect bacteria in the environment in 15 minutes to two hours. The sensor is based on a folded strand of complementary DNA that unfolds upon bonding with a sensed target sequence, allowing a fluorescent molecule attached to one end of the DNA to glow. Lighthouse Biosciences in West Henrietta, New York is commercializing the technology. Other similar efforts at Northwestern University (used in a product by Nanosphere of Northbrook IL) and MIT are also briefly cited in the article. [October 2009. Military Implications, Source⁶³]

Neurotoxins Detected/Neutralized by New Fast Molecular Configuration

A new type of organophosphate neurotoxin sensor molecule that detects such neurotoxins as sarin up to 105 times faster than previous reagents was developed by researchers from the Scripps Research Institute in La Jolla, CA. The detector also renders the toxin harmless, and signals its activity by significantly increasing the intensity of its fluorescence. [September 2009. Military Implications, Sources⁶⁴]

New Laser-based Gas Sensor Is Tunable over Wide Wavelength Range

A new type of optical gas sensor, using vertical-cavity, surface-emitting semiconductor laser diodes (VCSELs) has the important property of being tunable over a 5 nm spectral range, and thus able to detect a variety of different gases. The technology is being developed by NEMIS, an EU FP6 project at the Walter Schottky Institut, Technische Universität München in Munich. [December 2009. Military Implications, Sources⁶⁵]

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[Nano Gold May Offer Miniaturized Photoelectric Cell](#)

Promising Environmental-friendly Technologies

Improved Techniques for Water Desalination

A team led by Bruce Logan, Kappe Professor of Environmental Engineering, Pennsylvania State University, has modified a microbial fuel cell. It simultaneously desalinates salty water, and internally produces the electrical power required for operation, thus lowering the cost of water treatment. A different line of investigation, by Professor Shin-Ho Chung and a group from the Computational Biophysics Group of the Research School of Biology at the Australian National University, led to the discovery that using boron nitride nanotubes in desalination filters allows four times faster water flow, yielding a much faster and more efficient desalination process. [August 2009. Military Implications, Sources⁶⁷]

Evaporation Provides Power in New Desalination System

Saltworks Technologies in Vancouver, BC, Canada claims to have developed a desalination technology that uses up to 80% less energy than current commercial processes, according to the originators. The method depends on using heat in the environment to evaporate salty water to a high degree of concentration, and then setting up an “ionic current” which removes the Na and Cl components. The result, according to the developers, is a system that needs only enough external energy to drive its pumps. [November 2009. Military Implications, Sources⁶⁸]

New Membranes Claim to Cut Desalination Energy Requirements

A start-up company, NanoH₂O, is claiming a 20% reduction in the energy required for reverse osmosis desalination using its new membranes. Other companies (Danfoss, Novozymes, Aquaporin) are engaged in similar efforts. [January 2010. Military Implications, Source⁶⁹]

Desalination Reverse Osmosis Improved by Ion Concentration Polarization

Sung Jae Kim and Prof. Jongyoon Han of MIT’s Dept. of Electrical Engineering and Computer Science, and colleagues in Korea, have developed a new technique – ion concentration polarization – which promises to avoid two of reverse osmosis’s problems: large power

consumption and membrane fouling. The system is based on using microfluidics fabrication methods to produce microscopic filtration cells that could be assembled into an array with 1,600 units on an 8-inch-diameter wafer, capable of producing about 15 liters of water per hour. Since the system removes only salts and larger particles, it may need to be supplemented by a conventional filtration component (e.g. charcoal) for certain types of pollutants. [March 2010. Military Implications, Sources⁷⁰]

A New Water Management Tool

The Mapping Evapotranspiration with High Resolution and Internalized Calibration (METRIC) tool, developed by the Idaho Department of Water Resources and the University of Idaho, offers specific measurements of the water consumed across a region. Using surface temperature readings from satellites, air temperature, and a system of algorithms, the tool allows measurement of water quantities consumed on a certain piece of land through “evapotranspiration” (water that leaves the land for the atmosphere.) [September 2009. Military implications, Sources⁷¹]

Plastic Waste Yields Porous Paving for Walks and Drives

Civil and Environmental Engineering Prof. Naji Khoury of Temple Univ. has developed a technique for turning plastic bottle waste and coarse aggregate into a cement-like material, Plastisoil™, that he says is both cheaper and more energy-sparing than concrete or asphalt and that also has the advantage of being porous, so that rainwater drains through it. It also, of course, disposes of plastic bottles (30,000 per ton). [April 2010. Military Implications, Source⁷²]

Progress Announced in Methane-to-Liquid Process Development

Scientists at the departments of chemistry at the University of North Carolina at Chapel Hill and the University of Washington have announced the first observation of a metal complex (a compound consisting of a central metal atom connected to surrounding atoms or molecules) that binds methane in solution. This is an important first step in the development of a process for converting methane to a more easily transported and stored and more environmentally friendly liquid fuel. [October 2009, Military Implications, Sources⁷³]

New Tool for Reducing Carbon Emissions from Building Construction Projects

The Rocky Mountain Institute has released a new on-line computational tool, Green Footstep, which provides the design targets required to achieve carbon neutrality, net zero site energy, and other environmental objectives for a building construction project. It is based on information input about the location and other characteristics of the building, and the local ecosystem. The Green Footstep will produce a carbon emissions performance report for all phases of the work. [November 2009. Military Implications, Source⁷⁴]

Grease-repelling Surface Coating Reduces Need for Detergents

A new surface coating reportedly repels oils while allowing water through; hence, surfaces can be cleaned using reduced quantities of detergents, which are damaging to the environment. The

research team is led by Prof. Jeffrey Youngblood, of the School of Materials Engineering at Purdue University. [August, 2009. Military Implications, Source⁷⁵]

New Liquid Spray Glass Offers Rugged Surface Protection

A new spray-on liquid glass produces a water-resistant 100 nm-thick coating claimed to be environmentally harmless and easily wiped clean. Reportedly, it is “transparent, non-toxic, and can protect virtually any surface against almost any damage from hazards such as water, UV radiation, dirt, heat, and bacterial infections”, and is also flexible and breathable. The spray is being marketed by Nanopool GmbH of Hülzweiler-Schwalbach, Germany. [February 2010. Military Implications, Sources⁷⁶]

Nanoporous Alumina Membranes Useful for EHS Applications

A paper with senior author Dr. Roger Narayan, of the Joint Department of Biomedical Engineering, Univ. of North Carolina and NC State University, reports the use of atomic layer deposition onto nanoporous alumina membranes to produce a material for use in a variety of medical and environmental health applications; e.g., water purification using a zinc-oxide-coated membrane able to neutralize E. coli and Staphylococcus aureus. [April 2010. Military Implications, Sources⁷⁷]

Review of US National Nanotechnology Initiative

The President's Council of Advisors on Science and Technology (PCAST) discussed a review of the US National Nanotechnology Initiative Program Report in a meeting on March 12. The webcast of the meeting is archived

at <http://www.whitehouse.gov/administration/eop/ostp/pcast/meetings> ; the nanotech portion is at 5:30 into the recording. [March 2010. Military Implications, Sources⁷⁸]

Increasing Energy Efficiency Technologies

‘Energy Harvesting’ Offers Possibilities for Environment-sparing Power

A team of researchers at the Department of Aerospace Engineering, University of Bristol, UK, are investigating technologies for ‘energy harvesting’—the gathering of energy from low amplitude vibrations that occur naturally in the environment, such as from machines or even the human body. Their research is directed at making use of a much larger variety of vibrations than is currently possible, by employing transducers that respond to a wider range of frequencies. [December 2009. Military Implications, Source⁸⁰]

Solar-chargeable Lamp Provides Low-Cost Illumination

A group of scientists from the Risø National Laboratory for Sustainable Energy, in Denmark, has developed a low-cost (perhaps about \$4) plastic lamp, rechargeable from the sun. [June 2010. Military Implications, Sources⁸¹]

New Wearable Energy Charger Technologies

A wearable electrocardiograph energy-harvesting device, which provides tens of microwatts of energy per square centimeter, was developed by two R&D organizations, Holst Centre of Eindhoven, Netherlands, and IMEC of Leuven, Belgium. Reportedly, they combined a thermal harvester, matched specifically to a human body, with a large reduction in the power consumption of the driven wearable electronics. The system was able to charge two 2.4 v. batteries, can be easily integrated into fabrics, and can be well protected against damage. It earned the inventors the 2009 European Frost & Sullivan Award for Technology Innovation. A technology for dye-based solar cells developed by Dr. Michael Grätzel, a chemist and professor at the École Polytechnique Fédérale de Lausanne in Switzerland, has been licensed for application by G24 Innovations of Campbell CA, and other companies. The cells are being installed in sport bags, backpacks, and the like to allow users to recharge cell phones and other devices as they go about their activities; six to eight hours of sunlight is required for a full charge. Reportedly, companies like Nokia, Intel, Texas Instruments, Varta, and PG&E are carrying out R&D in this new field of “energy scavenging.” [Related item: *Energy Harvesting Offers Possibilities for Environment-sparing Power* in the December 2009 environmental security report.] [February 2010. Military Implications, Source⁸²]

Advances in Generating Electricity from the Body

The Parametric Frequency Increased Generators (PFIGs) developed by researchers of the Univ. of Michigan’s Engineering Research Center for Wireless Integrated Microsystems are reported to be able to generate 0.5 milliwatts from typical vibrations in the human body. Both piezoelectric and electromagnetic induction types have been tested and are claimed to be more efficient than previous devices with vibrations that are non-periodic and occur at low frequencies. [March 2010. Military Implications, Source⁸³]

Highly Conductive Fabrics Promise More Efficient Energy Storage

Dr. Liangbing Hu of Stanford University and colleagues have developed a family of highly conductive fabrics that hold out the promise of providing battery and supercapacitor electrodes with much higher energy density and durability than current exploratory materials like paper. [February 2010. Military Implications, Sources⁸⁴]

Power-generating Flexible Films Might Power Body-worn Devices

Michael McAlpine, a professor of mechanical and aerospace engineering at Princeton University, and colleagues have developed power-generating rubber films that are highly efficient in generating electrical energy when flexed. The films combine silicone and nanoribbons of lead zirconate titanate (PZT), a piezoelectric ceramic material that the developers say is 100× as piezo-efficient as quartz. [January 2010. Military Implications, Sources⁸⁵]

New Materials May Be Solar Cell Breakthrough

Two technologies developed by Prof. Benoît Marsan and colleagues at the Chemistry Dept. of the Université du Québec à Montréal may allow commercialization of the Grätzel dye-synthesized solar cell, a promising design based on the principle of photosynthesis, but whose application has been blocked by having a corrosive, opaque electrolyte and an expensive

platinum electrode. Prof. Marsan's variant uses a newly formulated transparent and neutral electrolyte and an electrode coated with relatively inexpensive cobalt sulphide. [April 2010. Military Implications, Sources⁸⁶]

New Structure Almost Doubles Solar Cell Efficiency

Researchers Kui-Qing Peng of Beijing Normal University, and Shuit-Tong Lee of the City Univ. of Hong Kong have developed a silicon solar cell with a unique and robust geometry of nanoholes having diameters of about 500-600 nm, achieving a power conversion efficiency of 9.5%, almost double the just over 5% efficiency of other current designs. [May 2010. Military Implications, Sources⁸⁷]

New Selective Radiation Surfaces May Save on Cooling Energy

Prof. Geoff Smith and Dr Angus Gentle of the Institute of Nanotechnology at the University of Technology, Sydney, Australia, are conducting research on materials for building surfaces that radiate back into the atmosphere at night, heat that was absorbed during the day. The heat is radiated at wavelengths which are not absorbed by the atmosphere but continue on out into space. The surfaces are coated with a mixture of silicon carbide and silicon dioxide nanoparticles, and have cooled surfaces to 15°C less than ambient temperature in Sydney. The scientists point out that the surfaces could cool air or water, which could then be pumped through buildings to cool them. [January 2010. Military Implications, Source⁸⁸]

Nano-infused Paper Substrate Improves Energy Storage Capabilities

A research group at Stanford University, led by Yi Cui, assistant professor of materials science and engineering, has shown that paper coated with ink made of carbon nanotubes and silver nanowires makes a more durable component for flexible batteries and supercapacitors than the plastic used in previous experiments. According to Cui, “The paper supercapacitor may last through 40,000 charge-discharge cycles—at least an order of magnitude more than lithium batteries. The nanomaterials also make ideal conductors because they move electricity along much more efficiently than ordinary conductors.” [December 2009. Military Implications, Sources⁸⁹]

Nanowire Solar Cells Have Prospect of Higher Efficiency

Researchers at the Eindhoven University of Technology in the Netherlands are working on nanowire-based solar cells, which, when combined with proper mirror systems, might reach an efficiency as high as 65%, at a cost of less than \$0.50/watt. [June 2010. Military Implications, Source⁹⁰]

Algae Provide Material for New Thin and Flexible Battery

Scientists at the Ångström Laboratory at Uppsala University, Sweden, have developed a new type of battery, using algae-derived polypyrrole-coated cellulose for electrodes, separated by saline-soaked filter paper, yielding a product which, although less powerful than conventional units, is light-weight, inexpensive, and environmentally friendly to produce. [October 2009. Military Implications, Sources⁹¹]

Genetically Modified Virus Claimed to Separate Hydrogen from Water

Scientists at MIT have used a genetically modified virus to split water molecules into hydrogen and oxygen, similar to photosynthesis. [April 2010. Military Implications, Sources⁹²]

Inexpensive Metal Catalyst for Hydrogen Generation from Water

Researchers with DOE's Lawrence Berkeley National Laboratory and the Univ. of California, Berkeley, have discovered an inexpensive metal catalyst that can effectively generate hydrogen from water. The proton reduction catalyst is based on a molybdenum-oxo metal complex that is about 70 times cheaper than platinum, today's most widely used metal catalyst for splitting the water molecule, according to Dr. Hemamala Karunadasa, who also states "In addition, our catalyst does not require organic additives, and can operate in neutral water, even if it is dirty, and can operate in sea water". At present, however, the process requires an excessive expenditure of electrical energy. [May 2010. Military Implications, Sources⁹³]

Fiber Bundles Claimed Safe for Hydrogen Storage and Cuts Costs and Weight

Israeli scientists working for C. En Ltd. in Geneva claim that their new hydrogen-filled capillary fiber bundles provide safe storage of hydrogen for less than half the space and weight of tanks installed in existing hydrogen cars. A unit containing 4 million of the hair-thin capillaries will store enough gas for 400 km of auto travel, according to the researchers. [April 2010. Military Implications, Sources⁹⁴]

Fiber-based Solar Cells Decrease Cost and Double Output

Wake Forest University's Center for Nanotechnology and Molecular Materials has announced a new technology that inexpensively produces solar cells with double the power output of other designs. The cells are based on microscopic plastic optical fibers, enhanced with red dye or other absorbent. This raises the prospect of shipping the untreated cells to less developed areas for finishing with dye from pokeberries, which thrive under sub-optimal conditions, and where costs for such a processing facility would be low. The technology has been licensed to FiberCell Inc. in Winston-Salem NC. [April 2010. Military Implications, Sources⁹⁵]

New Dye-Sensitized Solar Cells Show Increase in Energy Conversion Efficiency

A new type of dye yields dye-sensitized solar cells with a three-fold increase in energy conversion efficiency over current versions. The dye has been developed by researchers from Monash University and the University of Wollongong, Australia, and the University of Ulm, Germany. [December 2009, Military Implications, Source⁹⁶]

Thin Crystalline-Silicon Photovoltaic Cells Offer Many Advantages

Scientists at Sandia National Laboratories have developed crystalline-silicon photovoltaic cells from 14 to 20 μm thick and 0.25 to 1 mm across. According to the announcement, the new devices "are expected eventually to be less expensive and have greater efficiencies than current photovoltaic collectors that are pieced together with 6-inch-square solar wafers." Further, "they use 100 times less silicon to generate the same amount of electricity," and "Since they are much

smaller and have fewer mechanical deformations for a given environment than the conventional cells, they may also be more reliable over the long term.” A major manufacturing convenience is that a very large number can be created from a single 12- or 18-inch diameter wafer, allowing defective cells to be individually discarded. [December 2009. Military Implications, Source⁹⁷]

Quantum Dots Offer New Possibilities for Energy from Waste Heat

Peter Hagelstein, an associate professor of electrical engineering at MIT, and associates have published a paper setting forth new results that promise major improvements in devices for converting waste heat into electrical energy, offering both high efficiency and high throughput power. Additional technological development will be needed, but MTPV Corp. of Boston is working on exploitation of these ideas. [November 2009. Military Implications, Sources⁹⁸]

Carbon Nanotubes Yield Threefold Increase in Thermocell Efficiency

Dr. Ray Baughman, director of the Alan G. MacDiarmid NanoTech Institute at the Univ. of Texas at Dallas, and an international team of collaborators, report a way to use carbon nanotubes in large thermocells to generate electricity from heat at about 60% of the cost per watt of existing solar cells. [March 2010. Military Implications, Sources⁹⁹]

Genetically Engineered Bacteria Convert CO₂ to Liquid Fuel

Scientists led by James C. Liao, Professor of Chemical and Biomolecular Engineering at UCLA’s Henry Samueli School of Engineering and Applied Science, have genetically modified a cyanobacterium to consume CO₂ and use sunlight-driven photosynthesis to produce the liquid fuel isobutanol, which can potentially be used as a alternative to gasoline. [December 2009. Military Implications:, Source¹⁰⁰]

Biofuels Production from Sunlight and CO₂

Prof. David Wendell and colleagues at the Univ. of Cincinnati describe a design for foam loaded with natural (e.g. algal) enzymes that produce sugars from sunlight and carbon dioxide. The sugars can then be converted into biofuels. The process is more efficient than the natural one since all the incoming solar energy is used for the conversion, without part being diverted to support a living organism.

Meantime, Joule Biotechnologies, Inc. of Cambridge, MA announced arrangements for building its first pilot plant, in Leander TX, for developing and testing its continuous process system that uses genetically engineered organisms to directly convert sunlight and CO₂ into ethanol or other fuels. It claims that its lab-scale ethanol tests have already reached productivity rates exceeding 6,000 gallons/acre/year. [March 2010. Military Implications, Sources¹⁰¹]

Solid Oxide Fuel Cell Claims Reduced Lifecycle Cost

Thomas Adams and Prof. Paul I. Barton of the MIT Chemical Engineering Dept. have proposed a design for a natural-gas-powered solid oxide fuel cell that they claim, under a favorable carbon pricing structure, has a lower lifecycle cost than present designs. Their system produces pure CO₂, avoiding the step, presently required for carbon sequestration, of separating that gas from the total output stream. [December 2009. Military Implications, Source¹⁰²]

Nanofibers Provide Energy-efficient White Light

Researchers at RTI International, Research Triangle Park, North Carolina report developing an energy-saving light source using polymer nanofibers. The device produces 55 lumens/watt of light output, more than five times as much as traditional incandescent lamps, provides excellent color-rendering, and, unlike CFLs, does not contain mercury. [February 2010. Military Implications, Source¹⁰³]

Changing Temperature Changes Roof Tiles from Black to White to Save Energy

A group of recent MIT graduates have developed a material for roofing tiles that changes color from black to white as the temperature rises, reflecting the sun's heating rays, and thus saving on building cooling requirements and consequent energy demand, while still absorbing the radiation in cold weather. Nick Orf, a member of the Thermeleon team, says it is determined to pursue the project and develop it into a marketable product, but also notes that the material's cost and durability remain to be explored. [October 2009. Military Implications, Source¹⁰⁴]

Technologies for New Generation of Cars

Techniques Provide Improved Lithium-ion Battery Performance

An article in MIT's Technology Review reports that an advance in lithium-ion battery design by Prof. Yi Cui and colleagues at the Dept. of Materials Science and Engineering, Stanford University, has dramatically increased efficiency. A new anode structure using carbon nanowires coated with amorphous silicon provides about 2000 milliampere-hrs/g. This is an almost six-fold increase over today's graphite-based 360 mA-hrs/g. The article also briefly describes related work being carried out at other laboratories. In a related development, researchers at the Chinese Academy of Sciences' Key Laboratory of Molecular Nanostructure and Nanotechnology have synthesized a nanocomposite of LiFePO₄ nanoparticles embedded in a nanoporous carbon matrix as a superior cathode material for lithium-ion batteries. Although this compound offers 170 mA-hrs/g, it has other deficiencies that the new structure ameliorates. Next Alternative Inc. of Ottawa, Canada also claims to have a greatly improved battery design based on carbon nanotubes. [August 2009, Military Implications, Sources¹⁰⁶]

Electric Vehicle Powered by Sodium-Nickel-Chloride Batteries

The prototype of Electric Daily, the first zero emission light commercial vehicle produced in Latin America was presented by Iveco in Brazil. The prototype uses three Zebra Z5 sodium, nickel, and chloride batteries claimed to be completely recyclable and not producing gaseous emissions. [September 2009. Military implications, Source¹⁰⁷]

New Ceramic Membrane Enhances Battery Performance

Ceramatec Inc. of Salt Lake City, Utah announced development of a new battery design, based on a paper-thin ceramic membrane. The company claims that their sodium-sulphur unit will store 20-40 kWh in a package the size of a refrigerator, operate below 90°C, and withstand 3,650 daily

discharge/recharge cycles over 10 years. The expected sales price is around \$2000. [August 2009, Military Implications, Source¹⁰⁸]

New Low-cost, Durable Hydrogen Producing System

A team led by Thomas Nann and Christopher J. Pickett at the University of East Anglia reports a new technique for light-driven catalytic production of hydrogen from water. The new system consists of a gold electrode covered with layers of indium phosphide (InP) nanoparticles, combined with an iron–sulfur complex, $\text{Fe}_2\text{S}_2(\text{CO})_6$, and irradiated while immersed in water with a small electric current. The system produces hydrogen with an efficiency of 60%, and lasts much longer than present systems with organic components. Another improvement in hydrogen production may come from the work at the laboratory of Prof. Jin Zhang at UC Santa Cruz, where a combination of elemental doping and quantum dot sensitization has produced improved photoanodes for photoelectrochemical cells. [February 2010. Military Implications, Sources¹⁰⁹]

New Developments in Hydrogen Production

Several new techniques have been added to the published set of tools for economical production of hydrogen; e.g. as input to fuel cells. Sun Catalytix of Cambridge, MA has been awarded \$4 million through ARPA-E for work on its artificial photosynthesis based on a cobalt-phosphate catalyst that converts water and carbon dioxide into hydrogen and oxygen. The laboratory of Prof. Craig Hill at Emory Univ. has announced the fastest homogeneous carbon-free molecular water oxidation catalyst (WOC) yet created, based on cobalt. Univ. of Wisconsin-Madison geologist and crystal specialist Huifang Xu and colleagues have designed “a simple and cost-effective technology for direct water splitting that may generate hydrogen fuels by scavenging waste energy, such as noise or stray vibrations from the environment”, according to the developers. The new piezoelectric device uses zinc oxide and barium titanate nanofibers placed in water. Dr. Di Zhang, of Shanghai Jiao-Tong University, and collaborators have embedded a nitrogen-doped titanium dioxide catalyst in a complex physical structure modeled on natural plant leaves’ micro-architecture to produce, “enhanced light-harvesting and photocatalytic hydrogen evolution activities”. [March 2010. Military Implications, Sources¹¹⁰]

Nano Gold May Offer Miniaturized Photoelectric Cell

Prof. Dawn Bonnell, Director of the Nano/Bio Interface Center at the University of Pennsylvania, and colleagues have announced a technology that uses gold nanoparticles to increase the efficiency of production of current in photovoltaic cells by factors of 4 to 20 over present structures. “If the efficiency of the system could be scaled up without any additional, unforeseen limitations, we could conceivably manufacture a one-amp, one-volt sample the diameter of a human hair and an inch long,” says Prof. Bonnell. [February 2010. Military Implications, Sources¹¹¹]

Early Warning Systems

Elements of Prototype Tsunami Prediction System Tested

Reportedly, a team from NASA's Jet Propulsion Laboratory in Pasadena CA has "successfully demonstrated for the first time elements of a prototype tsunami prediction system that quickly and accurately assesses large earthquakes and estimates the size of resulting tsunamis." A key element in the new system's performance is its taking into account the characteristics of the continental shelf near the epicenter. [June 2010. Military Implications, Source¹¹²]

Multi-component Environmental Sensing System Could Help Anticipate Crises

Prof. Eyal Ben-Dor of Tel Aviv University's Department of Geography has recently described applications of his team's 'Hyperspectral Remote Sensor' concept, which combines ground-, air-, and space-based physical, chemical and optical sensors to provide advance warnings of disasters or post-event damage assessments. [October 2009. Military Implications, Source¹¹³]

Landslide-Predicting Sensors to Be Developed

Dr. Kirk Martinez, from Southampton University's School of Electronics and Computer Science, and Prof. Jane Hart, of the School of Geography, are continuing to develop fist-sized sensors that will monitor such soil parameters as light, conductivity, tilt, temperature, and movement, and transmit the data by radio, enabling the prediction of imminent landslides. [April 2010. Military Implications, Source¹¹⁴]

Space Technology

European Space Agency's Soil Moisture and Ocean Salinity Mission to Help Improve Water Management

ESA's SMOS is consistently mapping soil moisture in land and salinity in oceans, documenting their variations and thus advancing understanding of the water cycle and helping weather and climate modeling, as well as improving water resource management. [February 2010. Military implications, Sources¹¹⁵]

New UN Satellite Standards to Help in Natural Disaster Situations

The UN International Telecommunication Union (ITU) approved a set of new recommendations for radio-communication standards for satellite services in case of natural disasters. They refer to radio frequencies that can be used by both fixed-satellite service (FSS) and mobile-satellite service (MSS) systems for facilitating emergency and disaster relief operations. The ITU calls on the international community, policymakers, and service providers to further enhance efforts for developing robust and comprehensive systems for early warning, relief, and mitigation in case of emergencies and disasters at international, regional, and national levels. [March 2010. Military implications, Sources¹¹⁶]

Technologies that Could Trigger New Forms of Arms Race

Synthetic Gene Ordering Security Screening Up for Discussion

A proposed Code of Conduct for the DNA synthesis services industry is scheduled to be discussed and possibly adopted at the International Association of Synthetic Biology's (IASB) Second Annual Industry Workshop on Technical Solutions for Biosecurity in Synthetic Biology in Cambridge MA on November 3, 2009. The IASB developed such a code, but a similar but less rigorous and less costly process is advocated by two leading companies, raising safety concerns among scientists. A UC Berkeley scholar characterizes it as "a standards war that is a race to the bottom." [September 2009. Military Implications, Sources¹¹⁸]

Computer-Designed Genome Creates First "Artificial Cell"

Researchers at the J. Craig Venter Institute announced the successful construction of the bacterial cell *Mycoplasma mycoides* JCVI-syn1.0, the first synthetic cell designed in a computer and self-replicating, controlled only by the synthetic genome. Since the applications could vary from great improvements to the human condition to new forms of bioweapons, President Obama assigned the Presidential Commission for the Study of Bioethical Issues to assess the potential opportunities as well as risks (such as environmental and security) triggered by the new achievement. Meanwhile, the FBI Biological Sciences Outreach Program launched an initiative aimed at educating scientists on the potential security threats posed by synthetic biology. [Related item: *New Technologies Need New Regulations Systems* in March 2009 and other items on this issue in previous environmental security reports.] [May 2010. Military Implications, Sources¹¹⁹]

Botox Creates Basis for New Terrorist Weapon

Counterterrorist experts claim Al-Qaeda has tried to acquire botulinum toxin (an extremely deadly poison), which is found in the Botox beauty treatment. Chechnya and other parts of the world may have counterfeit Botox production facilities that can produce and sell botulinum on the Internet. Increasing markets for counterfeit beauty and pharmaceutical products could lead to increased access for biological terrorism. Although it is known that such illicit facilities exist, they are difficult to find. Due to specific characteristics, the most likely attack is contamination of food or water supplies. [Related item: *New Technologies Need New Regulations Systems* in March 2009 and other items on similar issues in previous environmental security reports.] [January 2010. Military implications, Sources¹²⁰]

International Legal Frameworks Needed for Cybersecurity

After land, sea, air, and space, cyberspace became the "fifth battlespace" on the agenda of security experts. The next 'Pearl Harbor' is likely to be a cyberattack, says CIA director Leon Panetta. The disruption of critical infrastructure such as water or electricity by cyberattacks in an IT-dependent world calls for exceptional strategies. "A new legal and policy framework is needed for addressing cybersecurity challenges", noted Lt. General Keith A. Alexander, nominee to head the Pentagon's new CyberCommand in testimony before the U.S. Congress, April 15, 2010. Some experts identify three levels of severity for cybersecurity: cybercrime, cyberespionage and reconnaissance, and cyber-leveraged war. There are documented massive

cyberespionage schemes such as the one managed from China against several countries (including India and Pakistan). Additionally, electromagnetic pulses could be used for destroying critical infrastructure (see item *International Standards Needed to Reduce Hi-tech SIMAD Threats* in May 2009 environmental security report.)

Efforts to improve managing cyber-leveraged war, so that damage is contained and reduced, include NATO's recent gathering of top cyber-minds to address the evolution of conflict in an Internet-dependent world, and National Security Agency and other cyber security experts' participation in the Cyber Defense Exercise (CDX) hosted by Lockheed Martin - Greenbelt (for the eighth year). The European Commission will conduct a feasibility study for creating a body that would assess trends in cybercrime across the EU and facilitate harmonization of related legislation among the different legal systems of the 27 EU countries (while the EU states have yet to ratify the Convention on Cybercrime adopted in 2001). In the meantime, there are proposals to include in the WEEE directive (for waste electrical and electronic equipment) provisions to facilitate protection of data stored on discarded devices. [April 2010. Military Implications, Sources¹²¹]

Reconsidering the Rules for Space Security

Reconsidering the Rules for Space Security by Nancy Gallagher and John D. Steinbruner reviews the current regulations that currently govern the use of space and the relevancy of the 1967 Outer Space Treaty. It argues that the U.S. should advance international negotiations based on the Treaty for developing new rules that explicitly address problems of space security, to specifically outlaw weaponization of space, and define the legitimate limits of space-based support for military missions. Some practical recommendations for successful negotiations include strategies for equitable distribution of the costs of compliance systems. [October 2009. Military Implications, Source¹²²]

B. Preventing or Responding to Environmentally Caused Conflicts

SECURITY IMPLICATIONS OF ENVIRONMENTAL ASPECTS

Climate Change Threats Increasingly Top Security Agendas

"Warming increases the risk of civil war in Africa," the first study assessing quantitative links between climate change and the risk of civil war found that in sub-Saharan Africa, between 1980 and 2002, the incidence of conflicts across the continent rose by nearly 50% with a 1°C temperature increase in a given year. Using these assumptions and 20 global climate models, the researchers warn that without swift mitigation action, the incidence of African civil war could increase 55% by 2030 relative to 1990.

"If uncontrolled, climate change will have security implications of similar magnitude to the World Wars, but which will last for centuries [...] Security sector actors must not just prepare responses to the security challenges of climate change; they must also be part of the solution," states the report *Climate Change and the Military: The State of the Debate* prepared by the Institute for Environmental Security and partner organizations. In this spirit, the First Statement of the Military Advisory Council of the Climate Change and the Military project calls upon governments to integrate into their respective military strategies the security implications of climate change, and on the military to reduce its own carbon "bootprint." Climate and Energy the Dominant Challenges of the 21st Century from members of the Center for Naval Analyses Military Advisory Board states that climate and energy security threats "will dominate and shape the state of nations in the decades to come." [November 2009. Military Implications, Sources¹²⁵]

Climate Change at the UN and G-20

Climate change was the focus of several international summits held in September 2009: the UN Climate Change Summit that attracted 100 Heads of State and Government and was convened by UN Secretary-General Ban Ki-moon, the Climate Change Summit of the Alliance of Small Island States (ASOIS), the UN General Assembly, the G-20 summit, and additional international forums held in parallel with these summits. Although the issues discussed ranged from addressing economic crises to disarmament and reforming the UN system, the theme most mentioned was climate change and policies to address its causes and effects, including adaptation and setting emission reduction targets. The AOSIS underscored security implications of climate change and asked for a greater say in the related negotiations. Vanuatu's Prime Minister Edward Natapei emphasized that "climate change poses a real threat to the future survival of mankind." French President Nicholas Sarkozy reiterated the call for creation of a new World Environment Organization to replace the current several disparate agencies and committees. UN reform ideas converged towards a more representative Security Council and more powerful General Assembly so that its resolutions are implemented and legally binding. [September 2009. Military Implications, Sources¹²⁶]

Seven Tipping Elements That Could Transform the Planetary Systems

Increasingly, scientists agree on some tipping elements that are extremely sensitive to climate shifts and therefore might have an important impact on the planetary systems. “The problem with tipping elements is that if any of them tips, it will be a real catastrophe,” notes Anders Levermann, climate physicist at the Potsdam Institute for Climate Impact Research in Germany.

The seven tipping elements considered are:

- Polar sea ice—passing a potential warming tipping point might cause serious loss of ice sheets and associated sea-level rise
- Amazon rainforest—increased weather-altering deforestation after passing a critical deforestation point
- Chad Bodélé Depression—substantial increase in dust production from the 10,000 square mile Saharan plain that now puts 700,000 tons of dust into the atmosphere annually
- South Asian Monsoons—amplified monsoon systems triggered by increased heat
- The Gulf Stream—due to lack of good models, the IPCC’s estimate of 10% Gulf Stream slowdown during the 21st century is uncertain
- Seafloor methane—increased release of methane (a powerful greenhouse gas) from methane hydrate in the seafloor, due to warming over a tipping point
- The Future—unknown features that could trigger radical changes

Scientists point out that an additional important unknown element is the interaction of these and other known elements. [December 2009. Military Implications, Sources¹²⁷]

The Haiti Earthquake Disaster Could Stimulate Improved Resilience Planning

The current chaotic situation and humanitarian disaster resulting from the 7.3 magnitude earthquake on January 12, 2010 in Haiti demonstrates the need for improved early warning, resilience training, and post-disaster international coordination. Since scientists warn that the number and intensity of natural disasters will increase, the need for such systems and training will increase. Unique preparation is needed for poorer, less resilient countries like Haiti.

UNEP is working for the Haiti Regeneration Initiative to be implemented by a wide range of partners for long-term sustainable development and reduction of vulnerability to natural hazards through ecosystem restoration and sustainable natural resource management. [Related item: *International Early Warning Programme to Begin Operations* in March 2007 environmental security report.] [January 2010. Military Implications, Sources¹²⁸]

Environmental Performance Index 2010 Score Worse for Vulnerable States

The 2010 Environmental Performance Index ranks 163 countries on 25 performance indicators tracked across ten policy categories. It facilitates cross-country comparisons as well as analysis of how the global community and individual countries are performing in particular sectors and policy issues, therefore helping assess the sectors that should be improved. The 2010 EPI reveals that most of the lower ranked nations are also vulnerable states, hence proving again the importance of including environmental aspects in peace and vulnerability strategies. [January 2010. Military Implications, Source¹²⁹]

Monopoly over Rare Earth Elements Raises Security and Environmental Concerns

Most new technologies—from low-carbon energy production to defense—require rare earth elements (REEs) for their manufacture. However, the distribution and exploitation of these elements is limited, with over 95% of all REEs for world consumption being produced in China. China’s own increasing technological and green energy generation needs might considerably impact the supply and/or price of some REEs (such as neodymium, praseodymium, dysprosium, and erbium used for wind turbine generators). John Kaiser, a California-based mining expert and rare-earths specialist, warns, “If the world gets really serious about green technology, it could result in a scale of demand that rare-earth suppliers would be unable to cope with.” Pricing and different work and environmental standards are among the main factors impeding exploitation outside China. Business and political leaders should re-assess the supply situation of REEs in view of new technological and security needs. [Related item: *Future Lithium Dependency Raises New Energy Security Concerns* in March 2009 environmental security report.] [January 2010. Military Implications, Sources¹³⁰]

The Competition for Rare Earth Metals Set to Continue

As green technology and energy are taking off, the competition for rare metals that are needed for the energy generation and storage equipment is increasing. Although rare earth metals are relatively abundant in the Earth’s crust, their extraction is difficult and environmentally polluting. Presently, over 90% of these minerals are mined in China, who increasingly wants to keep more for its own industry and allegedly expressed intentions to reduce or even stop the export of some of these resources. Meantime, although some of these materials could be retrieved from recycling used electronics, electronic waste is exported for salvage to countries in Asia and Africa. Although mines are planned in California, Australia, Canada, and Greenland, setting them up, meeting environmental standards, and workforce cost might delay exploitation. [May 2010. Military Implications, Source¹³¹]

The Race for Natural Resources a Potential Impediment for Peace

Afghanistan’s natural resources have become more prominent in the media due to the recent discovery of previously unknown mineral deposits, such as copper, iron ore, lithium, and gold. However, concerns increase that the race for rare minerals could exacerbate conflict in vulnerable countries rich in those resources, such as the current case in the Congo. [Related item: *Monopoly over Rare Earth Elements Raises Security and Environmental Concerns* in January 2010 environmental security report.] [June 2010. Military Implications, Sources¹³²]

EU Expert Group Suggests Action to Secure 14 Critical Raw Materials

An EU expert group has presented a final report identifying 14 raw materials as “critical” for EU industries, and suggesting that the EU take diplomatic steps to ensure that its companies gain easier access to them in the future. The 14 materials are antimony, beryllium, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, platinum group metals, rare earths, tantalum and tungsten. [June 2010. Military Implications, Sources¹³³]

Climate Change Requires Water Management Changes

The UN Secretary-General's Advisory Board on Water and Sanitation (UNSGAB) released the Hashimoto Action Plan II. It aims to support meeting the water-related Millennium Development Goals over the next three years. The Plan includes adaptation to climate change, water issues and disaster, and linking water-related disasters to climate change and sustainable development.

Meanwhile, experts warn that the approximately 300 agreements among States that border a shared river might not adequately address future pressures, mostly those caused by climate change. Peter Gleick, president of the Pacific Institute notes, "New disputes are already arising in transboundary watersheds and are likely to become more common." Pacific Institute's report "Understanding and Reducing the Risks of Climate Change for Transboundary Waters" recommends: 1) conducting climate impact, vulnerability, and adaptation assessments, 2) evaluating existing treaties' and agreements' flexibility in light of changing conditions, 3) enforcing and expanding the scope of existing international legal frameworks, and 4) establishing new agreements for transboundary basins. The study also contains some specific case studies of regions where climate change, water issues, and international politics collide (including the Mekong River in Southeast Asia, the Guaraní Aquifer in South America, and the Nile River in Africa). [February 2010. Military Implications, Sources¹³⁴]

Yemen's Internal Conflicts Are Water-Induced

A new analysis of Yemen's drastic water situation points out that an estimated 80% of conflicts in Yemen are over water. The country's water table is dropping about 6.6 feet per year, and in the capital, Sana'a, water extraction rates are about four times that of replenishment. At this rate Sana'a could become the first waterless capital in the world in five to seven years. Water used for agriculture accounts for about 90% of all consumption, and about 50% of it goes to growing qat (khat), a mild narcotic plant. Since plantations are often controlled by the so-called qat mafia, if farmers would be offered an alternative to qat, the critical water, food, and security situations would be addressed together. [January 2010. Military Implications, Sources¹³⁵]

Reports addressing the Link between Climate Change and Conflict

'Human Securitising' the Climate Security Debate, by Lorraine Elliott, is a working paper of the Asia Security Initiative Policy Series. It assesses the connection between climate change and national, regional and international security from a human security point of view. The recommendations basically advocate pro-active rather than reactive strategies based on vulnerability vs. risk and adaptation and social resilience vs. mitigation. In order to avoid conflict, scarce resource management should include equity provisions regarding those most vulnerable to environmental scarcities.

Climate Conflict: How Global Warming Threatens Security and What to Do about it, by Jeffrey Mazo from the IISS Environmental Security and Science Policy, provides a view of how climate changes affects security from a historical perspective. It points out that the most vulnerable countries are not necessarily the fragile states or those most affected physically by the effects of climate change, but those that fail to overcome cultural, social, political, and economic barriers to successful adaptation to a changing climate. [April 2010. Military Implications, Sources¹³⁶]

State of the World 2010 Calls for a New Paradigm in Addressing Security

Worldwatch Institute's annual report *State of the World 2010: Transforming Cultures; From Consumerism to Sustainability* is a comprehensive assessment of the strategies and measures necessary for improving humanity's prospects by switching away from consumerism-based patterns. Concerning security, the report argues that as "it will become increasingly clear that the biggest threats to national security are not foreign armies or terrorist groups but the weakened state of the planet," there will be important changes to the security and legal systems, including new concepts such as "Earth jurisprudence," while a more balanced military-to-climate budget would "do more to protect people than the largest nuclear arsenal ever could, and in the process it will create additional economic opportunities and new openings to improve diplomatic relations between countries." The recommendations include, inter alia, the establishment of global political institutions for guaranteeing security, and increasing use of environmental restoration, diplomacy, and cooperation for addressing conflict. [December 2009. Military Implications, Source¹³⁷]

Arctic Debate

Arctic Debates Continue

As foreign ministers of five Arctic states—Canada, Denmark, Norway, Russia and the U.S.—met in Chelsea, Quebec, on March 29, 2010, states member of the Arctic Council that were left out of the talks (Iceland, Sweden, and Finland) along with various northern aboriginal groups publicly expressed their frustration. Although the outcomes of the meeting were not available at the time of this writing, there are speculations that in view of some military strategies calling for measures to ensure that the Arctic remains free of nuclear weapons, Canada might declare the Northwest Passage a nuclear-free-zone.

The Russian Security Council announced that over the next 10-15 years, Russia might face serious national security problems as melting permafrost—that covers roughly 60% of Russian land—could jeopardize important infrastructure, including pipelines, railways, roads, and several urban areas. [March 2010. Military Implications, Sources¹³⁹]

Arctic "Pole of Peace" Suggested to Address Arctic Security Issues

In view of the increasingly heated debate over the Arctic due to increased access to resources, a group of Arctic security experts suggest that the U.S. should take the lead in proposing that the central Arctic Ocean be declared a "pole of peace and international cooperation based on shared interests in environmental security," and invite Canada, Denmark, Norway and Russia to endorse the initiative. This might address the controversies over sovereign rights and jurisdiction. [December 2009. Military Implications, Sources¹⁴⁰]

Arctic Civil and Military Activities Increasing

Satellite measurements of the thickness of the arctic ice revealed that the Arctic Ocean's permanent ice cover around the North Pole has thinned by more than 40% since 2004. Experts are therefore reassessing the timing of when the Arctic would be ice-free in the summer.

Jonas Gahr Støre, Norway's foreign minister predicted that the "northeast passage" for shipping around Russia's arctic coast and across the North Pole will be opened within a decade.

The route through previously inaccessible Russian waters would cut sailing times between Rotterdam in the Netherlands and Yokohama in Japan by 40%, while also providing a safer and “pirate-free” route for trans-global shipping.

A Danish defense position paper suggests substantial enhancement to the country’s northern military capabilities, including creating a dedicated arctic military body (potentially an Arctic Command) that would combine army, navy and air force assets, as well as upgrade of surveillance systems. A more detailed plan is expected for fall 2009. As many nations increase military resources dedicated to arctic operations, worry increases that conflict potential is also increasing.

The Arctic Marine Shipping Assessment, by the Arctic Council, reiterates warnings that an expected increase in shipping threatens the fragile ecosystem due to release of oil and other hazardous substances, harm to marine wildlife, and introduction of new invasive species. Recommendations include, inter alia, that arctic nations increase efforts for reducing pollution from ships, and consider designating special Arctic Ocean areas for environmental protection. [July 2009. Military Implications, Sources¹⁴¹]

New Developments by Canada and the U.S. in Arctic Security

A high-level Canadian delegation, led by the Prime Minister, made a five-day tour of the northern military operations and held a cabinet meeting in Iqaluit as part of an effort to stress Canada’s sovereignty in the region. Nevertheless, it is not clear yet how much Canada will allocate to increase its security capacity in the North. In the meantime, the U.S. Coast Guard is developing strategies to strengthen security in the Arctic region, including a new duty station. The U.S. is among the countries that consider the Northwest Passage an international waterway, rather than Canada’s sovereign waters. [August 2009. Military Implications, Sources¹⁴²]

Russia and Norway Agree on Maritime Delimitation of Disputed Arctic Territory

Norway and Russia reached agreement over the borders and use of a disputed territory of 175,000 square kilometers (108,740 sq miles) of Arctic shelf, concluding some 40 years of negotiations. The joint declaration signed on April 27, 2010 stipulates the maritime delimitation lines and creates cooperation opportunities for exploitation of the area’s rich natural resources. Some further technical details need to be worked out until the final treaty, which then will need to be ratified by the two countries’ parliaments. The agreement might also represent an important step forward in the multilateral negotiations concerning the Arctic territories. [April 2010. Military Implications, Sources¹⁴³]

Russia Suggests Opening New Transportation Corridor via the Arctic

Russia is suggesting the opening of a new transport corridor from Europe to Southeast Asia, via the Arctic region. One of Russia’s largest shipping companies, Sovkomflot, intends to send a tanker from Murmansk to Southeast Asia in November to validate the new waterway. In addition to being much shorter, the new pirate-free route is also safer. If the plan proves viable, Russia will set up the administrative infrastructure to manage navigation across the Arctic, such as small maintenance ports. [May 2010. Military Implications, Source¹⁴⁴]

Arctic Opens to International Commercial Use

The first telecommunication project in the Arctic is to link Tokyo and London by underwater fiber optic cable through the Northwest Passage, thus cutting the transmission delay from 140 milliseconds to 88 milliseconds. Branch lines would also link to the U.S. East Coast, ensuring quicker transmission times between Tokyo and New York. In addition to being faster, these lines are apparently also more secure, avoiding critical regions.

A report by UNESCO, “Climate Change and Arctic Sustainable Development” is a comprehensive assessment of the environmental and social transformations of the Arctic due to climate change, proposing an integrated approach for monitoring and adapting to climate change in the Arctic based on multilateral collaboration among scientists, circumpolar communities and decisionmakers. [January 2010. Military Implications, Sources¹⁴⁵]

Canada to Map about 2,500 miles of Arctic Seafloor

While national claims over the Arctic’s potentially mineral-rich seafloor are increasing, only about 5% of the Arctic floor has been mapped with modern sonar technology. Canada will send two robot submarines in March 2010 to gather evidence to help Canada’s claims for extending its continental area. The two 20-foot autonomous underwater vehicles will be equipped with specialized echo-sounder equipment, potentially helping scientists create a three-dimensional geographical map, as well as continuously collecting data for about 250 miles at a time, creating images of the expedition’s 2,500 or so miles. [February 2010. Military Implications, Sources¹⁴⁶]

NATURAL DISASTERS AND SCIRNTIFIC EVIDENCES

Scientific Evidences and Potential Consequences of Climate Change

(Listed by month in reverse chronological order)

May 2010 was the 303rd consecutive month that was hotter than the 20th century global average for that month, according to NOAA’s National Climatic Data Center. The combined global land and ocean surface temperature for May was 59.84°F (15.46°C), which was 1.24°F (0.69°C) above the 20th century average of 58.6°F (14.8°C).

The Web-based climate policy assessment system ‘Climate Action Tracker’

(www.climateactiontracker.org) shows that present developments and actions pledged globally “give virtually no chance to limit global mean temperature increase to below 2°C by the end of the century. ...[and] give us a virtual certainty of exceeding 1.5°C, with global warming very likely exceeding 2°C and a more than 50% chance of exceeding 3°C by 2100” [June 2010.

[Military Implications, Sources¹⁴⁹](#)]

Scientists have found that the upper 700m of the ocean has warmed significantly between 1993 and 2008 – the period covered by the study – and slightly faster than IPCC estimates. NASA scientists observed that 80-90% of the increased warming ends up in the ocean, with a double effect on potential sea level rise: from expansion of water volume, as well as diminishing capacity to absorb CO₂ and therefore further stimulating the effects of global warming. The research was conducted by an international team of scientists from NOAA, NASA, the Met

Office Hadley Centre in the United Kingdom, the University of Hamburg in Germany and the Meteorological Research Institute in Japan, and published in the report *Robust Warming of the Global Upper Ocean*. Meantime, oceans are more acidic “than they have ever been for at least 20 million years,” according to a report by the European Science Foundation. It reveals that seas have already become 30% more acidic in the past 200 years as the oceans absorbed about a third of the CO₂ emissions from human activities since the Industrial Revolution and if current trends continue, they could be 150% more acidic by 2100 than they were in pre-industrial times. [May 2010. [Military Implications, Sources](#)¹⁵⁰]

In March 2010, the combined global land and ocean surface temperature was the highest since record keeping began in 1880, according to NOAA and confirmed by NASA. NOAA found the combined global land and ocean average surface temperature 1.39°F (0.77°C) above the 20th century average, while NASA found the March combined average global land-surface air temperature a record 1.9°F (1.05°C) above the 20th century average.

Climate change and man-made CO₂ emissions are changing ocean chemistry and marine ecosystems, reveal new studies. *Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean* by the National Research Council, warns that the level of ocean acidity is increasing at an unprecedented rate and since the ocean absorbs approximately a third of CO₂ emissions, unless man-made CO₂ emissions are substantially curbed or controlled by technological means, the ocean will continue to become more acidic. Meantime, global warming is changing oceans salinity, making some regions saltier, while other are getting fresher, according to research conducted by the Australian government’s research agency CSIRO Wealth from Oceans Flagship using data gathered by the global network of 3,200 Argo buoys. [April 2010. [Military Implications, Sources](#)¹⁵¹]

Global temperatures have risen steadily since the 1970s, reveals the ‘Current GISS Global Surface Temperature Analysis’ by the NASA Goddard Institute for Space Studies (GISS). Comparing the global surface and ocean temperature changes, researchers conclude that global temperature continued to rise at a rate of 0.15-0.20°C per decade, despite large year-to-year fluctuations associated with the El Niño-La Niña cycle.

Australia’s temperatures rose 0.7°C (0.4°F) over the past 50 years, with warming occurring across the country, with the last decade being the hottest on record, reveals the “State of The Climate” report by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The report also shows that sea levels rose 7-10 millimeters (0.3-0.4 inches) per year around Australia’s north and west, while rainfall patterns varied sharply among regions. The past southern hemisphere summer was 0.2°C (0.32°F) warmer than the previous high in 1997-1998, reaching an average of about 29.6°C (85.3°F).

Severe droughts affecting some East and Southeast Asian countries caused water levels of rivers and reservoirs to drop at dangerous levels. China’s State Commission of Disaster Relief announced that the worst drought in Southwest China in 60 years is affecting 51 million people and is having a devastating effect on regional power supply and farming. In the Philippines, what seems to be the worst drought since 1998 affects 23 provinces. In Vietnam, drought dried up riverbeds and aggravated saline water intrusion into coastal areas, threatening the country’s southern Mekong Delta. Thai Department of Disaster Prevention and Mitigation announced that nearly 4 million people in some 36 out of Thailand’s 76 provinces have been affected by drought since November.

CO₂ levels rose to a median 393.71 parts per million in the first two weeks of March, from 393.17 ppm in the same period of 2009, and the increase seems accelerating, reveal new measures at Norway's Zeppelin station on the Arctic Svalbard archipelago. Similarly, a 2009 study of the ocean off Africa indicated CO₂ levels in the atmosphere were at their highest in 2.1 million years. [March 2010. [Military Implications, Sources](#)¹⁵²]

The UNEP information note "How Close Are We to the Two Degree Limit?" reveals that under present pledges by countries to cut greenhouse gas emissions, there are slim chances of reaching the goal of keeping a global temperature rise at below 2°C (3.6°F) at the end of the century.

The Antarctic Climate and Ecosystems Cooperative Research Centre in Tasmania found evidence of interdependence between drought in Western Australia and snowfall in Antarctica: the heavier the snowfall is in Antarctica, the less the rainfall is in Australia's southwest. The conclusions are based on studying 750-year-old ice-core samples.

In 2009, the average temperature in the Tibet Autonomous Region reached a record high of 5.9°C (42.62°F), 1.5°C (2.7°F) higher than "normal" (an average over several decades.). Chinese climatologists report that temperatures in Tibet rose by an average 0.32°C (0.58°F) per decade since 1961, when meteorological records began, which is considerably higher than the global average of 0.2°C (0.36°F) per decade. [February 2010. [Military Implications, Sources](#)¹⁵³]

A preliminary analysis from the National Climatic Data Center of the National Oceanic and Atmospheric Administration (NOAA) found that the decade 2000-2009 is the warmest decade since instrumental measurements of temperatures began in the 1880s, and 2009 (tied with 2006) was the fifth warmest year on record, based on measurements taken on land and at sea. The average trend over the past three decades is warming at about 0.36°F (0.2°C) per decade, while average global temperatures have risen by about 1.5°F (0.8°C) since 1880.

According to the Met Office's forecast made using the Decadal Prediction System (DePreSys), 2010 could yet be the hottest year on record, due to a new El Niño warming period that has just started in the Pacific. Additionally, the sun should also begin to brighten, as part of its 11-year brightness fluctuation cycle (in 2009 it was at the bottom of the cycle.) Further, if not for 2010, then "a record breaker will still occur in the next few years" says Doug Smith, climate expert at the Met Office.

Oddball Winter Weather: Global Warming's Wake-Up Call for the Northern Unites States, a study by the National Wildlife Federation, documents how climate change is linked to precipitation increase, including intense snowstorms, as warmer winter weather causes more surface water evaporation (and less freezing), thus recharging the atmosphere with moisture. This explains the unusually heavy snowfall in many parts of the world. [January 2010. [Military Implications, Sources](#)¹⁵⁴]

The past ten years have been the warmest in 160 years of recorded history, reveals preliminary data released by the UK Met Office based on temperature records from over 1,500 global monitoring stations. Similarly, based on preliminary data the World Meteorological Organisation announced that 2009 will be one of the ten warmest individual years recorded, with a temperature 0.44°C (0.79°F) above the long-term average of 14°C (57.2°F).

Preliminary disaster figures for 2009 show that over 75% of the people killed and 95% of the total affected by natural hazards were due to extreme weather events, says a joint press release by the UN International Strategy for Disaster Reduction, UNDP, and World Meteorological Organization. Although the 2009 statistics show lower figures compared to previous years, Margareta Wahlström, UN Special Representative of the UN Secretary-General for Disaster Risk Reduction, warned that “extreme weather disasters remain top of the list and will continue to affect more people in the future.”

The Global Climate Risk Index 2010 compiled by Germanwatch, shows that the top 10 countries most affected in the past 20 years by extremes of climate are: Bangladesh, Myanmar, Honduras, Vietnam, Nicaragua, Haiti, India, the Dominican Republic, Philippines, and China. The Global Climate Risk Index analyzes the impacts of weather-related loss events—mainly storms, floods and heat waves—and is based on the NatCatSERVICE database of Munich Re. [December 2009. [Military Implications, Sources](#)¹⁵⁵]

Global mean warming might reach 7°C (12.6°F) by the end of the century, without drastic mitigation efforts, estimate scientists contributing to the IPCC AR5, due in 2013. *The Copenhagen Diagnosis* is “an interim scientific evaluation” prepared for the December climate Summit. Similarly, the Global Carbon Project warns that unless urgent actions are taken to reduce CO₂ emissions, global temperatures are on course to rise by about 6°C by the end of the century. They estimate that emissions rose by 29% between 2000 and 2008, and suggest that in order to limit global temperature rise to 2°C, average carbon emissions per capita for goods and services should be reduced to 0.3 metric tons by 2050, from 1.3 metric tons now.

The 2008 Greenhouse Gas Bulletin by the World Meteorological Organization also reveals that the global trend of rising atmospheric global greenhouse gases (GHG) continues. Globally, the averaged mixing ratios of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) reached new highs in 2008; and, while some halocarbons, such as chlorofluorocarbons (CFCs), are decreasing slowly as a result of the implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer, concentrations of their substitutes, such as HCFCs and HFCs, are increasing rapidly. Simultaneously, the first comprehensive study accounting for oceans’ intake of CO₂ over the past 250 years reveals that since 2000, as the oceans’ acidity increases, their carbon-sequestration capacity is declining. Therefore, “we cannot count on these sinks operating in the future as they have in the past, and keep on subsidizing our ever-growing appetite for fossil fuels,” says lead author, oceanographer Samar Khatiwala, from Columbia University. A recent assessment financed by the Global Environment Facility indicates that 61 of the world’s 64 large marine ecosystems experienced a significant increase in sea surface temperatures in the last 25 years. [November 2009. [Military Implications, Sources](#)¹⁵⁶]

Scientists found that Arctic Ocean waters are acidifying at an unprecedented rate, as more CO₂ can dissolve in cold water than warm. Research carried out in the archipelago of Svalbard revealed that seawater could reach corrosive levels within 10 years, thus jeopardizing shellfish and other life forms and livelihoods depending on it. At this rate, scientists fear that 10% of the Arctic Ocean will be corrosively acidic by 2018; 50% by 2050; and entirely by the end of the century. [October 2009. [Military Implications, Sources](#)¹⁵⁷]

By 2060, the global average temperature could rise by 4°C (7.2°F), unless sound greenhouse gas emission reduction strategies are implemented, revealed a study by the UK Met Office,

prepared for the Department of Energy and Climate Change. Nevertheless, UNEP's "Climate Change Science Compendium 2009" estimates that even in the best case scenario—if the world's most ambitious targets are met—the planet will still warm by 3.5°C (6.3°F) by the end of the century. The calculations consider the upper-range targets of nearly 200 nations' climate policies (e.g. U.S. emissions reduction of 73% from 2005 levels by 2050, EU 80% from 1990 levels by 2050). The report also notes that sea level might rise by 6 feet by 2100 instead of 1.5 feet, as projected by the IPCC.

The August 2009 ocean surface temperature was the warmest since 1880, when record keeping began. The average ocean surface temperature for June–August was 16.9°C (62.5°F), which is 1.04°F above the 20th century average, according to NOAA's National Climatic Data Center. For the same period, the combined global land and ocean average surface temperature was 16.2°C (61.2°F), the third warmest on record, and 1.06°F above the 20th century average. [September 2009. [Military Implications, Sources](#) ¹⁵⁸]

In July 2009, the world's oceans reached the highest average temperature since record keeping began 130 years ago. Some NASA scientists suggest that warming oceans could cause Earth's axis to shift more than previously estimated, with potential implications for interpreting how the Earth wobbles.

Another record was set by big tropical storms in the Atlantic, as the average frequency of hurricanes over the past decade was higher than at any time in the last 1,000 years, reveals a study published in the journal *Nature*.

As CO₂ levels are increasing at a faster rate than the IPCC worst-case scenario, the planet might be heading for an "irreversible" climate change by 2040 says a paper by Andrew Brierley of St. Andrews University and Michael Kingsford of the James Cook University in Australia, which specifically examines the effect of CO₂ emissions on ocean ecosystems. [August 2009. [Military Implications, Sources](#) ¹⁵⁹]

Scientists say that the effects of El Niño on the global climate vary and might be altered by global warming, and they warn that an emerging El Niño could cause droughts, floods and an increased number of forest fires. There is a strong correlation between intense El Niño and droughts in Southeast Asia and floods in western Latin America—Colombia, Ecuador and elsewhere. In a recent study, periodic warming of the central Pacific was linked to an increase in Atlantic hurricanes. [July 2009. [Military Implications, Sources](#) ¹⁶⁰]

Other Natural Disasters

NASA Scientist Warns of Possible Severe Solar EMPs in 2013

Dr Richard Fisher, the director of NASA's Heliophysics Division, has warned in an interview that the coincidence of the sun's magnetic energy and sunspot cycles in 2013 could produce devastating electromagnetic pulses (EMPs), disabling large portions of the electricity grid. The National Academy of Sciences made a similar forecast two years ago. [June 2010. [Military Implications, Source](#) ¹⁶¹]

MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES

Climate Refugees Trends

WFP Executive Director Josette Sheeran announced that WFP will step up its support to address the intense droughts in Niger, which are escalating the humanitarian crisis and are contributing to mass migration from rural to urban areas as well as to neighboring countries. In Southern Niger, the food crisis is estimated to be affecting 7.8 million people.

The flooding and landslides in Rio de Janeiro, Brazil, killed over 200 people and greatly affected the impoverished communities. In response, authorities ordered the eviction of thousands of poor people from the favelas, despite their opposition and threats of revolt. [April 2010. [Military Implications, Sources](#)¹⁶⁴]

In northeastern Syria, drought lasting for more than three years triggered one of the largest internal displacements in the Middle East in recent years. Some 300,000 families had to move to urban areas, as their livelihood has been destroyed. Lack of economic alternatives and an adequate government response continue to worsen the deteriorating situation. [February 2010. [Military Implications, Sources](#)¹⁶⁵]

The small island developing states continue efforts to have their fate stipulated in a binding treaty on climate change. “It is important that the recognition of SIDS as most vulnerable countries be preserved in a legally binding outcome and that these countries receive priority access to resources for urgent adaptation and mitigation projects,” said Mark Jariabka, executive director of Islands First, an organization that promotes and protects the interests of SIDS. In addition to vulnerability, they are concerned about lack of any bilateral or multilateral agreements for eventual relocation. “Even if such an agreement is signed between an island nation and another host country, this itself will raise a number of issues regarding international law - sovereignty status, U.N. membership etc. etc.” says Ambassador Abdul Ghafoor Mohamed, the permanent representative of Maldives to the United Nations. “Do these people relocate as a ‘nation’ or as individual refugees who are then subsumed into the host nation as their own citizens, or would they enjoy ‘sovereign rights’? Would they continue to have claim to the territory of the land they had vacated? If not, who would have claim on it, if at all?” questions the Ambassador. [January 2010. [Military Implications, Sources](#)¹⁶⁶]

In view of the fact that Pacific Islanders are among the most affected by climate change, UNHCR has partnered with other agencies to form a Pacific Humanitarian Protection Group, which will help map and analyze the protection needs of people in the region, and address disaster preparedness, mitigation and adaptation together.

Tuvalu, the fourth-smallest nation on Earth, might become the first country to be rendered unlivable by global warming. Nevertheless, the relocation of some Tuvalu communities has been well-managed so far, given its small population. However, the situation might get more difficult for the relocation of population from other areas vulnerable to climate change such as Africa’s Sahel, coastal Bangladesh, and Vietnam’s deltas. The displacement of those populations could be “a phenomenon of a scope not experienced in human history,” warns Koko Warner, an expert on climate change and migration at the United Nations University in Bonn.

A UNHCR working paper “Climate change, disaster, displacement and migration: initial evidence from Africa,” based on evidence from Burundi and Somalia, indicates that the frequency of climate-related disasters has increased in the past two decades and underscores that disasters and environmental degradation can trigger displacement and conflicts, which can further accentuate environmental degradation.

A report by the Norwegian Refugee Council, “Climate Changed: People Displaced” also explores who are affected by climate related displacement, and how they are assisted and protected, when displaced within the borders of their own country or across borders. [December 2009. [Military Implications, Sources](#)¹⁶⁷]

Nearly 10% of the world’s population—500 million to 600 million people—are at risk from displacement by climate change, and up to 150 million “climate refugees” might move to other countries by 2050, predicts the report *No Place Like Home* by the Environmental Justice Foundation. Some countries—Tuvalu, Fiji, the Solomon Islands, the Marshall Islands, the Maldives and some of the Lesser Antilles—are in danger of losing a significant part of their land in the next 50 years, while others could see large movements of people: Bangladesh, Kenya, Papua New Guinea, Somalia, Yemen, Ethiopia, Chad, and Rwanda.

In an address to the Third Meeting of the Global Forum on Migration and Development held November 4th, in Athens, Greece, UN Secretary-General Ban Ki-moon, identified climate change along with human trafficking and economic crisis as a cause of international migration, , therefore emphasizing that protection of vulnerable communities should be a priority of adaptation efforts. [November 2009. [Military Implications, Sources](#)¹⁶⁸]

UNDP’s Human Development Report 2009, *Overcoming barriers: Human mobility and development*, focuses on different forms of migration. The report indicates that out of about 1 billion migrants worldwide, 740 million are intrastate, and only about a third of the transnational migrants move from a developing country to a developed one. The report notes that climate change-induced displacement is very difficult to estimate, due to many uncertain variables, and comments that estimates of 200 million to 1 billion migrants by 2050 do not take into account the adaptation and mitigation measures, while environment-related migration is directly dependent on livelihood opportunities and public policy responses combined.

The UN Special Rapporteur on adequate housing, Raquel Rolnik, reiterated the need for some legal framework for environmental refugees, to ensure that people affected by climate change are treated with dignity, offered appropriate housing and livelihoods, and social organizations of those affected are protected. [October 2009. [Military Implications, Sources](#)¹⁶⁹]

In 2008, climate-related natural disasters displaced about 20 million people, compared to 4.6 million who were internally displaced by conflicts, revealed a UN report compiled by the UN Office for the Coordination of Humanitarian Affairs and the Internal Displacement Monitoring Centre. Trying for the first time to quantify the number of people displaced by climate change, the UN study estimates that out of the total of 36 million people displaced by rapid-onset natural disasters, 15 million were due to the Sichuan earthquake, while 90% of the others were due to floods, storms, drought and other climate change-related phenomena. [September 2009. [Military Implications, Sources](#)¹⁷⁰]

The Future is Here: Climate Change in the Pacific, a report by Oxfam Australia, warns that by 2050, more than 75 million people living in the Asia-Pacific region will have to relocate due to the effects of climate change. Some have already been displaced because of food and water shortages, the rising incidence of malaria, and more frequent flooding and storms. Although some islands began adaptation plans, the report underlines that many people will not be able to relocate within their own country; hence, developed nations in the region, such as Australia, should work with Pacific nations' governments to design immigration strategies.

In Bangladesh, thousands of people are becoming environmental refugees every year, and their number is growing due to increased frequency of natural disasters and rising sea levels. Experts warn that unless there is implementation of adequate policies and strategies for addressing adaptation and climate change, by 2030-2050, at least 35 million Bangladeshi will have to migrate, since one-third of the country might be submerged due to sea level rise. [July 2009. [Military Implications, Sources](#)¹⁷¹]

RISEING SEA LEVELS

Scientific Evidences and Potential Consequences

A tiny island in the Bay of Bengal, known as New Moore Island to the Indians and South Talpatti Island to the Bangladeshis, claimed for years by both countries, has disappeared beneath the rising sea, says the Indian School of Oceanographic Studies in Calcutta. Studies reveal that sea levels in this part of the Bay of Bengal have risen much faster over the past decade than in the previous 15 years. Therefore, it is likely that other islands in the Sundarbans delta region will be covered by the sea, forcing large numbers of people to move. [March 2010; [Military Implications, Sources](#)¹⁷³]

Sea-level rise might reach 2 meters by 2100, say the new estimates by the interim scientific report *The Copenhagen Diagnosis*. It notes that global average sea-level rise was 3.4 mm/year over the past 15 years, 80% above the IPCC forecasts, but consistent with an accelerating melting of glaciers, ice caps, and the Greenland and West-Antarctic ice-sheets. The report also underlines that sea level will continue to rise over the next few centuries after global temperature have been stabilized. [November 2009; [Military Implications, Sources](#)¹⁷⁴]

UNEP reassessment of potential sea level rise based on the combined effects of melting land-ice and thermal expansion of oceans reveals a rise of 0.8–2.0 meters above the 1990 level by 2100, and 5–10 times that over following centuries.

According to an analysis based on ten years of global daily satellite images, 85% of the world's 33 largest delta regions experienced severe flooding due to sinking land and rising seas. The study warns that if ocean levels increase as projected under the moderate climate change scenarios, delta land vulnerable to serious flooding could expand by 50% this century, Asia being the worst affected. The study was led by the University of Colorado at Boulder. [September 2009; [Military Implications, Sources](#)¹⁷⁵]

MELTING SEA ICE AND GLACIERS

Scientific Evidences and Potential Consequences

A team of scientists led by University of Leeds estimates that net loss of floating sea ice and ice shelves in the last decade is 7,420 km³. While melting of floating sea ice and ice shelves do not add directly to sea level rise, it unblocks the way for more land ice to slide and melt into the sea; as well as decreasing the reflection of sunlight, it is warming the local area, further increasing melting and salinity dilution which expands sea volume a bit. They estimate that if all the polar ice melted, sea levels would rise by about 70 meters. [May 2010. [Military Implications, Sources](#)¹⁷⁷]

Andean glaciers in Latin America lost more than 40% of their surface area between 1956 and 2006, according to a study to be published by Ecuadorean glaciologist Bolivar Cáceres.

In Europe, almost 90% of Austrian glaciers shrank in 2009, some by as much as 46 meters (150 feet), reports the Austrian Alpine Association. [April 2010. [Military Implications, Sources](#)¹⁷⁸]

A new study reveals that Greenland ice loss is happening faster than anticipated and spreading along the northwest coast, with acceleration likely since late 2005. The research is based on results from a combination of satellite [Gravity Recovery and Climate Experiment (GRACE)] and by GPS measurements. They estimate the mass loss equivalent to be about 0.02 inch of global sea-level rise per year.

The Arctic melt might cost from \$2.4 trillion to \$24 trillion by 2050, due to rising sea levels, floods, and heat waves, according to the report “Arctic Treasure, Global Assets Melting Away” by the Pew Environment Group. It is estimated that the loss of Arctic sea ice and snow cover has already cost the world about \$61 billion to \$371 billion annually. [March 2010. [Military Implications, Sources](#)¹⁷⁹]

Greenland’s melting is accelerated by ice sheet erosion caused by winds and currents that drive warmer water into fjords, found scientists led by Fiammetta Straneo of Woods Hole Oceanographic Institution in Massachusetts. Detailed measurements of the water properties in the Sermilik Fjord revealed that deep warm water 3-4°C (37.4-39.2°F) is cutting into the base of the glaciers, accelerating their plunge into the sea. At present, sea level is rising at around 3 mm (0.12 inches) per year, compared to 1.8 mm (0.07 inches) a year in the early 1960s.

The Antarctic Peninsula’s ice front on the southern section has been retreating since 1947, with the most dramatic changes happening since 1990, states a U.S. Geological Survey report. “This is the first time since people have been observing the area, since the 1800s, that that ice shelf has not hitched together Charcot Island and the peninsula,” notes scientist Jane Ferrigno. Even in the Antarctic Peninsula’s coldest part, ice shelves are vanishing.

For the first time, the value of the Arctic’s declining ability to cool the climate has been quantified. The Pew Environment Group found that the cumulative cost of rapid melting of the region could range between \$2.4 trillion to \$24.1 trillion by 2050, and \$4.9 trillion to \$91.2 trillion by 2100. The factors considered included thawing permafrost, decline in albedo (reflectivity), and increase in methane emissions. The cost calculations included the impact of Arctic warming on agriculture, energy production, water availability, rising sea levels and flooding. The large range of estimates is due to the high level of uncertainty associated with

factors influencing climate change; however, the low end magnitudes are not trivial. [February 2010. [Military Implications, Sources](#)¹⁸⁰]

The report “Melting Snow and Ice: A Call for Action” notes that land ice melting is now becoming the dominant contributor to sea level rise, while receding glaciers threaten the livelihood of millions of people by inundation as well as decline of freshwater. The most important findings include: Greenland ice cap reduction rate tripled over the past decade; snow cover is diminishing, and glaciers from the Himalayas to the Alps are melting rapidly, with the greatest reductions in the Andes and the Rockies; while Antarctica, which seemed immune to global warming, now shows signs of net ice reduction on a similar scale to inland Greenland.

According to the report “Antarctic Climate Change and the Environment” by the Scientific Committee on Antarctic Research, although the bulk of the Antarctic ice sheet has shown little change, overall, 90% of the Peninsula’s glaciers have retreated in recent decades. While since 1980 there has been a 10% increase in Antarctic sea ice extent, particularly in the Ross Sea region, regional sea ice has decreased west of the Antarctic Peninsula. Loss of ice from the West Antarctic ice sheet might raise sea level by 1.4 meters (4ft 6in) by 2100, estimates the report.

According to a new study published in the journal *Geophysical Research Letters*, infragravity waves generated by ocean-storms could cause dramatic ice breakups far away from the storm’s origin, as the energy from the waves hitting a shore is echoed back into the sea for thousands of miles. Warming waters will likely aggravate the phenomena. [December 2009. [Military Implications, Sources](#)¹⁸¹]

The interim scientific report, *The Copenhagen Diagnosis* reveals: summer-time melting of Arctic sea ice surpassed by about 40% the Intergovernmental Panel on Climate Change’s forecasts for the period 2007–2009, Greenland and Antarctic ice-sheets are losing mass at an increasing rate, and glaciers and ice-cap melting accelerated in most parts of the world since 1990. Similarly, an analysis of data from NASA’s Gravity Recovery and Climate Experiment (Grace) mission reveals that the East Antarctic ice sheet, thought to be stable, has been losing 57 billion metric tons per year since 2006. [November 2009. [Military Implications, Sources](#)¹⁸²]

Losses from both Greenland and Antarctica have accelerated over the past seven years, shows a comprehensive continuous monitoring of the ice sheets using the Gravity Recovery and Climate Experiment (GRACE) satellite mission, which ‘weighs’ the ice on a monthly basis. NASA geophysicist Isabella Velicogna says that “That is a big thing,” and “We should be more concerned.” Similarly, based on recent field observation, David Barber, Canada’s Research Chair in Arctic System Science at the University of Manitoba, notes that the multiyear ice covering the Arctic Ocean is almost gone. [October 2009. [Military Implications, Sources](#)¹⁸³]

Findings outlined in the UNEP report “Climate Change Science Compendium 2009” reveal that mountain glacier melting seems to be accelerating. If current trends continue, most glaciers from the mountains of tropical Africa will disappear by 2030, and those from the Pyrenees by 2050. Similarly, most models project that by 2030, the Arctic Ocean might be ice-free in September. The Greenland ice sheet surface melting rate was some 60% higher in the summer of 2007 than the previous record in 1998.

NOAA's National Climatic Data Center noted that Arctic sea ice cover was an average of 6.3 million sq kilometers (2.42 million sq miles) during August, 18.4% below the 1979-2000 average. [September 2009. [Military Implications, Sources](#)¹⁸⁴]

Satellite records show that one of Antarctica's largest glaciers is thinning four times faster than thought ten years ago. At its current pace, Pine Island Glacier in west Antarctica could disappear in 100 years, 500 years sooner than previously thought. Meanwhile, at the other pole, three major glaciers — Gulkana and Wolverine in Alaska and South Cascade in Washington — are also decreasing at dramatic rates, according to a study by the U.S. Geological Survey. [August 2009. [Military Implications, Sources](#)¹⁸⁵]

Images by the Icesat satellite, launched in 2003, measuring Arctic sea ice thickness, revealed that the Arctic Ocean's permanent ice cover around the North Pole has thinned by more than 40% since 2004 as noted in item 5.5. Although scientists say that the loss was "remarkable", they refrain from speculating when the region would be completely summer-ice-free. Overall, the study says that the ice, typically up to about 3 meters thick, thinned by 67 centimeters over the observed period. The multiyear ice was reduced from 62% of the region's total ice volume in 2003, to only 32% in 2008, thus 68% represents "first-year" seasonal ice, which mostly melts during the summer.

Same rapid melting is revealed by the more than a thousand intelligence images of the Arctic region taken over the past decade and released at the request of the National Academy of Sciences. The images, being at higher resolution, depict pools of melted water on top of Arctic ice floes stretching across 30 meters. These pools, absorbing rather than reflecting the sun's heat, increase the melting process, further adding to global warming. [July 2009. [Military Implications, Sources](#)¹⁸⁶]

FOOD AND FRESHWATER

Food and Freshwater Scarcity Issues

(Listed by month in reverse chronological order)

According to the annual OECD and FAO joint report, food prices might increase drastically over the next ten years, with forecasts for wheat and coarse grain prices to rise between 15% and 40% (in real terms, adjusted for inflation, average levels during the 1997-2006 period—the decade before the price spike of 2007-08); vegetable oils are expected to be more than 40% higher and dairy prices are projected to be 16-45% higher. Much of the increase will be generated by growing demand from emerging markets and for biofuel production.

A 'water security risk index', compiled by British-based risk consultancy Maplecroft, found African and Asian nations had the most vulnerable supplies, judged by factors including access to drinking water, per capita demand and dependence on rivers that first flow through other nations. Somalia, where just 30% of the population has clean drinking water, is in the most precarious situation, followed by Mauritania, Sudan, Niger, Iraq, Uzbekistan, Pakistan, Egypt, Turkmenistan and Syria.

At the High Level International Conference on the Midterm Comprehensive Review of the Implementation of the International Decade for Action "Water for Life" 2005-2015, from 8-10

June 2010, in Dushanbe, Tajikistan, participants reviewed the progress during the first five years. The Dushanbe Declaration on Water, which includes a number of conclusions and recommendations, will be submitted to the UN General Assembly. The review highlights the importance of, among others: building resilience and reducing vulnerabilities to extreme events; enhancing hydrologic, hydrogeologic and meteorological data collection, assessment and dissemination capabilities; and sustained and predictable financial assistance and technology transfer to developing countries.

“Vision 2030: The resilience of water supply and sanitation in the face of climate change” is a collection of papers in preparation released by the WHO together with the UK Department for International Development, including a “full technical report, as well as detailed reports on climate change and technology projections, and a review of resilience and adaptive capacity, including a series of technology-by-technology fact sheets.” [June 2010. [Military Implications, Sources](#)¹⁸⁹]

UNEP warns in the “Green Economy Report: A preview” brochure that 30% of fish stocks have already been collapsed (i.e. less than 10% of their former potential yield) and virtually all commercial fisheries risk running out by 2050. The lives of some 520 million people are financially linked to fisheries today. While the entire value of fish caught is only \$85 billion, \$27 billion are spent on government subsidies, mostly in rich countries, leading to overexploitation. In “the Yearbook 2010” released earlier this year, UNEP warned that overexploitation, pollution, and rising temperatures threaten 63% of the world’s assessed fisheries stocks. It also warns that governance arrangements, population growth, increasing living standards, over-exploitation, declining water quality, and climate change will cause water scarcity to emerge as a challenge to governments by 2030.

An Israeli consortium unveiled the world’s largest reverse osmosis desalination plant in the coastal city of Hadera. The plant will supply 127 million m³ of desalinated water a year, representing about 20% of Israel’s yearly household consumption and is the third in a series of five desalination plants being built over the next few years that will eventually supply Israel with about 750 million m³ annually for addressing the country’s water shortage. While other Middle East countries have bigger desalination plants, those use thermal-based technology that requires more energy and is less environment-friendly.

Several Arab countries are looking into using technologies for increasing their agricultural land. An Abu Dhabi soil survey found that with adequate investment in the right technologies, over 200,000 hectares of land could be reformed for agricultural use, while Qatar and Kuwait are trying to increase domestic agricultural yields through mycorrhizae—the use of selected types of fungus that enhance the growth of plant roots in arid areas. In a matter of 18 months, the institute managed to convert 4,000 m² of “hyper-saline waste-land” in Qatar’s southern Dukhan area into a productive land for vegetables and crops production. Similar projects are going on in Kuwait, India, Oman, and the UAE. [May 2010. [Military Implications, Sources](#)¹⁹⁰]

“Arab countries do not disclose enough information on their water out of concern that transparency could fuel unnecessary public concern and unrest,” noted Hosny Khordagui, Regional Program Director of the UNDP Water Governance Programme for Arab States <http://www.alertnet.org/thenews/newsdesk/LDE6300FO.htm>. According to the UNDP’s Arab Human Development Report, people in the Middle East and North Africa have access to an average of only 1,000 cubic meters of water a year, one-seventh the worldwide rate, which by

2025 might be further reduced to 460 cubic meters due to high population growth and the effects of climate change. Arable land is also expected to shrink due to climate change, further jeopardizing poor farmers' livelihood and pushing people to move to overcrowded cities.

The worst drought in at least 50 years in southern China left tens of millions of people short of water and fuels disputes with countries that share the Mekong River, especially Thailand, over the role of Chinese dams in decreasing river flows. Some argue that more dams in China could help mitigate the Mekong's seasonal variations by storing or releasing water as necessary. [April 2010. [Military Implications, Sources](#)¹⁹¹]

The multiple crises in the Arab world, exacerbated by the effects of climate change, might increase the number of emergency situations, requiring food and water distribution to millions of people, warned officials attending the third conference of humanitarian organisations in the member states of the Organisation of the Islamic Conference (OIC). Similarly, the UNEP report "Environment Outlook for the Arab Region: Environment for Development and Human Well-being," compiled at the request of the Council of Arab Ministers Responsible for the Environment, outlines the multiple challenges facing the Arab region, ranging from climate change and food insecurity to decreasing water availability and unemployment. Highlighting that the region is one of the most water-scarce in the world, the report notes that biofuels and food security are key emerging and intertwined challenges facing the region. The region is predicted to be among the hardest hit by the potential direct and indirect climate change impacts, including: loss of coastal zones; more severe droughts and desertification; increased groundwater salinity; and a surge in epidemics and infectious diseases.

Experts warn that unless swift action is taken to improve water management, Lebanon might lack freshwater by 2015, due to the interplay of several factors, including: the 1975-1990 civil war and years of political unrest, water rights disputes with Israel, weak water management, and inappropriate infrastructure, exacerbated by a growing population. Additionally, some transboundary rivers are not exploited due to their strategic locations—such as the Nahr al-Kabeer and Orontes shared by Lebanon and Syria, and the Wazzani and Hasbani shared with Israel.

The report "An Overview of the Food Security Situation in Eastern Africa" by the UN Economic Commission for Africa's (UNECA) Sub-Regional Office for Eastern Africa (SRO-EA) is an assessment of food security-related initiatives, plans, and strategies in the SRO-EA mandate area. Describing the status of food security in six specific Eastern African countries (Uganda, Rwanda, Kenya, Tanzania, Burundi and the Democratic Republic of the Congo), it concludes that East Africa is the sub-region in Africa most affected by food insecurity. Recommendations include: increase investments in the agricultural sector to at least 10% of national budget; promote domestic and regional trade of agricultural products; and implement targeted input subsidies programs to enhance production and productivity. [March 2010. [Military Implications, Sources](#)¹⁹²]

The 33rd session of the Governing Council of the International Fund for Agriculture Development (IFAD), was held February 17-18, 2010 in Rome, Italy. The session underlined the impotence of smallholder farmers in addressing future agricultural challenges posed by climate change. Noting that food security is an integral part of overall security, both national and global, a high-level panel highlighted the importance of creating better market conditions to promote

private investment in smallholder agriculture, developing policies that support smallholder farmers, and allowing smallholder farmers to compete for scarce agricultural resources.

Although avoiding meat is generally considered beneficial to the environment and improved food security, a study by Cranfield University (commissioned by WWF) found a substantial number of meat substitutes consumed in the UK, such as soy, chickpeas and lentils, have a higher environmental footprint because they are imported from overseas. Additionally, potential deforestation to create agricultural land for producing those substitute products is counterproductive to addressing climate change. Similarly, the EU objective of obtaining 10% of all transport fuels from biofuels by 2020 is undermining food security of developing countries as EU companies have taken millions of acres of land for production of biofuels. ActionAid's new report, "Meals per gallon: the impact of industrial biofuels on people and global hunger," warns that if all global biofuels targets were to be met, food prices could rise by an additional 76% by 2020 and force an extra 600 million people into hunger.

According to a new report published in the *International Journal of Life Cycle Assessment*, 38% of the world area, in eight out of 15 existing eco-regions, is at risk of desertification due to unsustainable land use practices. The areas potentially most affected are: North Africa, the Middle East, Australia, southwest China, the western edge of South America (as well as some coastal areas and prairies), the Mediterranean region, savannahs in general, and the temperate, tropical and subtropical steppes.

A University of Sydney study presented at the Carbon Farming conference warned that more than 80% of the world's farming land is "moderately or severely eroded" and an estimated 75 billion metric tons of soil is lost annually. Soil in China is being lost 57 times faster than it can be replaced through natural processes, while in Europe it is 17 times faster, 10 times in America, and 5 times faster in Australia.

A recent Egyptian government study warns, "A 30 centimeter rise in sea level is expected to occur by 2025, flooding approximately 200 square kilometers (77 square miles). As a result, over half a million inhabitants may be displaced and approximately 70,000 jobs could be lost." Given the Nile Delta's importance for Egypt's food and economic security, its environmental health should be considered "a matter of national security," says Mohammed al-Raey of the Regional Disaster Response Centre.

In Niger, food insecurity affecting more than 7 million people and political instability (aggravated by the recent coup d'état) exacerbate each other. [February 2010. [Military Implications, Sources](#)¹⁹³]

A new report by the Division for Sustainable Development of the UN Department of Economic and Social Affairs assessed the impact of foreign land purchase for agriculture. Foreign governments and private investors are increasingly purchasing or leasing key farmland in Africa on a long-term basis. The report notes that it is critical to ensure that such contracts promote shared food security interests and meet the need for improving legal and technical capacities of host countries, as well as to conduct impact assessments for the host country on the benefits, costs, and risks associated with land acquisition.

Scientists warn that more attention should be given not only to the impact of climate change on food quantity, but to its nutritional quality too. They found that increasing levels of CO₂ in the atmosphere reduces the nutritional value of many basic food crops. It is estimated that the approximate 20% CO₂ rise since 1960 may have already decreased protein concentration in wheat flour by 5%–10%. A study by researchers at Southwestern University, Georgetown TX,

shows that if atmospheric CO₂ reaches 540–960 ppm, it could result in a significant decline (10%–15%) in protein content of major food crops including barley, wheat, soya bean and potato. Additionally, higher CO₂ levels may reduce water flow through a plant, affecting the uptake of micronutrients from the soil, such as sulphur, magnesium, iron, zinc, and manganese. [January 2010. [Military Implications, Sources](#)¹⁹⁴]

The Pacific Institute’s recently updated online chronology of water conflicts shows 6 incidents during 2009, up from 3 in 2008. Peter Gleick, President of the Pacific Institute, notes that a pattern of localized conflict is likely to emerge in sub-Saharan Africa, Southeast Asia, India, China, Pakistan, and Burma in coming decades. Although skeptical about ‘water war’ or full-scale interstate warfare triggered by water, he suggests that water and climate change should still be considered serious security issues. Terrorist groups could start to view water infrastructure as valuable targets as tensions rise over water’s availability, says Gleick. In addition, in countries like Pakistan, discontent with the West could intensify as water becomes scarcer, which could help extremists bring in new recruits.

The UN Food and Agriculture Organization (FAO) collection of three technical papers provides an overview of the current status of knowledge on “Climate Change and Implications for Fisheries and Aquaculture,” noting that ecosystem approaches to aquaculture and fisheries, as well as precautionary management, can help improve the resilience of the sectors and calling for the integration of fisheries and aquaculture into national climate change and food security policies.

The UN World Water Assessment Programme released two publications: “The Implications of Climate Change for Water—Highlights on Climate Change from the third World Water Development Report” addressing the potential impacts of a changing climate on the availability of water and on the control of water extremes; and “Water and Climate Change—An Overview from the WWDR,” that underscores that water is at the root of a complex vulnerability dynamic and describes the impacts of climate change on water, making some recommendations for responses to climate change focused on water and proactive adaptation measures.

The study “Local Responses to Too Much and Too Little Water in the Greater Himalayan Region” by a consortium of international organizations, based on the work of five field teams in China, India, Pakistan and Nepal, highlights that adaptation practices need to be aligned with other processes if they are to be successful, even over a short period. It also stresses the need for governments to prioritize the development and improvement of national and regional policies to provide better support for local long-term resilience and adaptation to more extreme climate. [December 2009. [Military Implications, Sources](#)¹⁹⁵]

Food Security and Agricultural Mitigation in Developing Countries: Options for Capturing Synergies, released by FAO prior to the World Summit on Food Security, says that 70% of agriculture’s mitigation potential can be realized in developing countries. The report highlights the importance of considering food security, agricultural mitigation, adaptation, and development in global agendas and national strategies for addressing climate change, and it stresses the need for reaching global consensus on measurable, reportable, and verifiable requirements.

Agriculture adaptability was also the main theme of the World Summit on Food Security held at FAO headquarters in Rome, Italy, November 16-18, 2009. UN Secretary-General Ban Ki-moon underlined that “there can be no food security without climate security.” The Summit adopted a Declaration that outlines strategic objectives, commitments and actions, and establishes the Five Rome Principles for Sustainable Global Food Security.

The World Bank report *Agricultural Development Under a Changing Climate: Opportunities and Challenges for Adaptation*, focuses on rural development in the context of climate risk management and adaptation, particularly on issues of seasonal climate forecasting, water management in rain-fed and irrigated production systems, sustainable land management, crop and livestock breeding, crop genetic diversity, seed systems, pests, and urban and peri-urban agriculture.

The FAO policy brief *Climate Change and Food Security in the Pacific* warns that climate change will have serious impacts on agriculture, forestry, and fisheries in the Pacific islands, leading to increased food insecurity and malnutrition. Considering climate change as a “threat multiplier” in a region that is already under severe ecological and economic stress, FAO urged governments and donors to start implementing robust and action-oriented climate change adaptation plans for all Pacific islands.

Aaron Wolf, Program Director in Water Conflict Management and Transformation at Oregon State University, said that the source of potential tensions and conflicts over water is not scarcity but poor capacity to deal with changes in the water basin. He gives as examples some regions that had organizations to oversee shared river basins; including those formed by India and Pakistan, and by Israel and its Arab neighbors, which had remained intact for decades. Colin Chartres, Director General of the Consultative Group on International Agricultural Research (CIGAR) warned that countries depending on snowmelt could expect water levels to drop by up to 30%. He underscored the need for investments amounting to \$270 billion in drinking and irrigation infrastructure in Sub-Saharan Africa and India. Along the same lines, the UNEP report, *Fresh Water Under Threat, Vulnerability Assessment of Freshwater Resources to Environmental Change, Africa*, calls for urgent adaptation measures to combat scientific and technical deficiencies, poor governance and management structures, pollution of water resources, and industrialization and urbanization. [November 2009. [Military Implications, Sources](#)¹⁹⁶]

The number of hungry people in the world rose to 1.02 billion this year. Varying impacts of climate change (including lower water availability, and an increase in plant and animal pests and diseases) could lead to a 30% reduction in agricultural productivity output in Africa and a 21% reduction in Asia, noted FAO Director-General Jacques Diouf, at the two-day high-level forum “How to Feed the World in 2050,” held October 12-13. About 300 experts attending the forum, debated policy, technology, and investment needs to achieve food security by 2050. FAO estimates that in order to ensure food security for over 9 billion people in 2050, investments in agriculture in developing countries should increase by about 50%, to \$83 billion a year (\$29 billion for India and China). Noting the challenge of feeding another 2.3 billion people by 2050 while at the same time limiting the environmental impact of the farm sector, the report *Reaping the benefits: Science and the sustainable intensification of global agriculture* by the Royal Society is calling for a £2 billion “Grand Challenge” research program on global food security including investment in genetically modified crops. The *Climate Change: Impact on Agriculture and Costs of Adaptation* report by the International Food Policy Research Institute, examining the impact of climate change on food security compared to a no-climate-change scenario, forecasts that in 2050 there will be a 90% increase in wheat prices, in the developing world calorie availability will decline relative to 2000 levels, and there will be an additional 25 million malnourished children.

The Africa Factbook 2009 by the Global Footprint Network warns that if current population and consumption trends continue, Africa’s Ecological Footprint will exceed its biocapacity within the

next 20 years, with some countries, including Senegal, Kenya, and Tanzania, potentially reaching that threshold in less than five years. It notes that between 1961 and 2005, while Africa's population grew from 287 million to 902 million people, the amount of biocapacity (food, fiber and timber resources that are renewably available) per person decreased by 67%. A World Summit on Food Security will be held at FAO headquarters in Rome, November 16-18, 2009.

In India, the four-month monsoon season ended with rains 23% below normal, causing the country's worst drought since 1972. Food prices already skyrocketed and threaten inflation. About half of India's 1.2 billion people depend on agriculture for their income.

The Water Governance Programme for Arab States was officially launched by the UNDP Regional Bureau for Arab States and the League of Arab States at the high-level Partners Meeting on Water Governance, on October 12, 2009. The Programme aims to support water management in the Arab States by integrating socio-economic and environmental dimensions. Meantime, Egyptian officials warn that the Nile Delta region is facing a double threat, due to freshwater needs which might surpass resources by 2017, and rising sea levels inundating much of the fertile Delta region, where 60% of the country's 78 million people live. Over the past decade, the Mediterranean is been rising an average of 2 centimeters annually, says Mohamed al-Raey of Alexandria University. A one-meter sea-level rise would submerge Alexandria. Meantime, Egypt is facing disputes with the other ten Nile basin countries that are demanding bigger shares of Nile water to compensate for reduced rainfall. [October 2009. [Military Implications, Sources](#)¹⁹⁷]

By 2050, to feed 9.1 billion people, world food production should increase by 70% and withdrawal of water for irrigation by almost 11%, notes FAO in a paper prepared for the high-level experts forum and World Summit on Food Security to be held in October 2009. Given that 90% of the growth in crop production is projected to come from higher yields and increased cropping intensity, even small changes in precipitation and/or crop yield due to climate change could have devastating impacts on food security in the world.

A study by the Asian Development Bank warns that if current trends persist until 2050, the yields of irrigated crops in South Asia will decrease significantly and resulting food scarcity will lead to higher prices and reduced caloric intake across the region. Under this scenario, per capita calorie availability in 2050 will be below levels recorded in the year 2000. Afghanistan, Bangladesh, India, and Nepal are identified as particularly vulnerable to falling crop yields caused by glacier retreat, floods, droughts, erratic rainfall, and other climate change impacts. The study, "Addressing Climate Change in the Asia and Pacific Region: Building Climate Resilience in the Agriculture Sector," was officially launched by ADB on the sidelines of the UNFCCC meeting held in Bangkok, September 28-October 9, 2009.

Researchers reiterated a warning that growing corporate control over seeds is reducing the diversity of traditional seed varieties and traits that help farmers adapt to the effects of climate change, jeopardizing poor farmers' livelihoods. They suggested that farmers would benefit from a similar legal protection over their traditional seed varieties and associated knowledge as do corporations through the international treaty on the protection of new varieties of plants. Researchers from the International Institute for Environment and Development (IIED) and partner organizations in China, India, Kenya, Panama and Peru launched the warning ahead of the 2nd World Seed Conference held September 8-10, 2009, in Rome, Italy.

A prolonged drought is sweeping across Kenya, thought to be a result of the El Niño cycle worsened by global warming and continued degradation of forest ecosystems. Crops have been destroyed, and domestic and wild animals are dying, negatively affecting the two key industries: agriculture and tourism. Four million Kenyans face mass famine, and foreign aid is reluctantly provided and inadequate. Tensions are spawning ethnic conflict as communities fight over the last remaining pieces of fertile grazing land. [September 2009, [Military Implications, Sources](#)¹⁹⁸]

Competition for food, water and energy is expected to worsen as the world's population increases faster than expected. The 2009 World Population Data Sheet by the Population Research Bureau reveals that world population will reach 7 billion in 2011 (a year earlier than expected), and 8.1 billion by 2025. With at least 97% of the growth occurring in developing countries, by 2050, nine in ten people under 25 will live in those countries, mostly in Africa and Asia. Africa's population reached 1 billion and will double by 2050.

Revitalizing Asia's Irrigation: To Sustainably Meet Tomorrow's Food Needs, a report by FAO and the International Water Management Institute calls for increased investments in irrigation systems and reforms in the way water is used for agriculture to feed an additional 2.5 billion people over the next 40 years. Otherwise, many developing nations face the risky prospect of having to import more than a quarter of their rice, wheat, and maize by 2050. "If nothing is done, you are going to get an increase in social unrest, migration and a fertile ground for terrorism," warns Colin Chartres, the director general of IWMI.

In China, 27% of the land area is now desert or suffering from land degradation, and experts warn that desertification is one of the greatest ecological threats to the entire Northeast Asia area. [August 2009, [Military Implications, Sources](#)¹⁹⁹]

Water to be Considered Integral Part to Copenhagen Negotiations

The Stockholm Statement adopted at the World Water Week conference held in Stockholm, August 16-22, 2009, calls for global water management strategies to be considered as integral parts of the negotiations for a global climate agreement in Copenhagen, in December. Some 2,500 water experts from 130 countries attended the meeting. It also stresses the need for a clear framework for more effective use of water across borders, as well as for better cooperation between officials involved in land and forest management, climate, and water issues. [Related item: *A New Step Toward Preventing Water Wars* in July-August 2008.] [August 2009, [Military Implications, Sources](#)²⁰⁰]

Water Management Is the Main Aspect of Water Security Issues

Water Security: Global, regional and local challenges published by the Institute for Public Policy Research is a policy brief examining the management of trans-boundary water resources. Analyzing the global policy framework in place for addressing water insecurity, it evaluates and makes recommendations for various policy alternatives to strengthen the framework. Similarly, the *Water Security: War or Peace?* report argues that a failure of politics rather than scarcity per se is a likely cause of "water war." Noting that transboundary water is generally managed peacefully, the paper suggests disconnecting water and national security discourses and rather associating water with cooperative attitudes. The paper also highlights that the capacity to adapt to scarcity tends to be underestimated. [May 2010. [Military Implications, Sources](#)²⁰¹]

Nile Basin Controversies Continue

The Cooperative Framework Agreement for water-sharing by the ten Nile basin countries was postponed for at least another six months. It is mainly opposed by Egypt, which doesn't want to renounce privileges given by previous agreements. Because of increased economic development in the region and the consequences of climate change, the Nile's flow is likely to decrease; hence, a Nile accord could be essential for preventing further escalation of disputes in an already vulnerable region. The ten Nile countries are: Burundi, the Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda. [Related items: *Water Scarcity* in February 2007 and several climate change-related items in previous environmental security reports.] [August 2009. Military Implications, Sources²⁰²]

Joint Afro-Arab Strategy for Addressing Agricultural Development and Food Security

At the Joint Afro-Arab Ministerial Meeting on Agricultural Development and Food Security, held February 14-16, 2010, in Sharm El Sheikh, Egypt, delegates agreed on an action plan to guide their collaboration in agriculture and food security, including climate change-related elements. The action plan includes a section on transboundary and environmental challenges, proposing mitigation and adaptation tools such as: implementation of international and regional environmental conventions and initiatives, development of a common position in international negotiations; creation of joint mechanisms and networks to coordinate and monitor climate change and other environmental issues; and strengthening the institutions dealing with environmental protection and climate change issues. [February 2010. Military Implications, Sources²⁰³]

HEALTH

CDC launches the National Environmental Public Health Tracking Network

The National Environmental Public Health Tracking Network website launched by the Centers for Disease Control and Prevention (CDC) aims to bridge the gaps in investigating how environmental contaminants affect human health. Currently, information is centered on air and water quality, but more data will be added concerning hazardous waste sites (both federal- and state-designated sites), pesticide exposure, and climate change. [July 2009. Military implications, Sources²⁰⁴]

Study Shows Deforestation Brings Malaria Epidemics

A study based on data collected in Brazil's Amazon forests region revealed a direct link between deforestation and the increasing incidence of malaria. The analysis shows that for the period August 1997 August 2001, a 4.2% change in deforestation can be associated with a 48% increase of malaria incidence. [June 2010. Military Implications, Sources²⁰⁵]

Health-related Climate Change Consequences, Trends, and Actions

The International Livestock Research Institute (ILRI), a member of the Consultative Group on International Agricultural Research (CGIAR), has announced the launch of a \$4.4 million

research project to build a climate model that can predict outbreaks of infectious disease in Africa. The research is being undertaken in Ghana, Malawi and Senegal, ILRI working with 11 partners and researchers to integrate data from climate modeling and disease forecasting systems in order to develop a capacity to predict the likelihood of epidemics six months in advance of an outbreak. [May 2010. [Military Implications, Sources](#)²⁰⁷]

To celebrate World Health Day on April 7th, WHO and the Commonwealth Secretariat released publications that underline the linkages between urban health and climate change. “Why Urban Health Matters” notes that urban areas concentrate both emitters of greenhouse gases and people at risk from climate change impacts such as heat waves, water scarcity, increasing levels of air pollution, or rising sea levels. A discussion paper by the Commonwealth Secretariat, “The State of the Cities: Why, and how, the Commonwealth must address the challenge of sustainable urbanization”, stresses that climate change and slum-based poverty are exacerbated by today’s urban growth. [April 2010. [Military Implications, Sources](#)²⁰⁸]

The WHO and UNDP has launched the first global project on public health adaptation to climate change. It involves a series of pilot projects that will seek to increase the adaptive capacity of national health system institutions. The projects will be undertaken by Ministries of Health and other relevant national partners in Barbados, Bhutan, China, Fiji, Kenya, Jordan and Uzbekistan, with varying foci. The project in China, for example, will focus on strengthening early warning and response systems to extreme heat in urban settings. [March 2010. [Military Implications, Sources](#)²⁰⁹]

WHO has published a draft discussion paper, “Gender, climate change and health” which aims to provide a framework for gender-differentiated health risk assessment and adaptation/mitigation actions in relation to climate change. It offers information on the health risks for women and men through the perspectives of direct and indirect consequences, and the possible interactions and specificities of biological, economic, and social risk factors in determining these impacts, including migration and displacement, shifts in livelihood as responses to climate change, and gaps in understanding needs. [February 2010. [Military Implications, Sources](#)²¹⁰]

The WHO report “Protecting Health from Climate Change: Connecting Science, Policy and People” provides an update of the scientific evidence on health risks caused by climate change. It outlines necessary action to protect health from negative impacts of climate change and describes a number of effective interventions that can save lives in the present and reduce vulnerability in the future. In addition, the report singles out several policy options in other sectors, such as transport and energy production, that could simultaneously improve health and reduce greenhouse gas emissions. [January 2010. [Military Implications, Sources](#)²¹¹]

Two reports by the World Health Organization, “Global Health Risks” and “Protecting health from climate change: global research priorities,” assess the potential health implications related to climate change, with detailed global and regional estimates, and making some policy recommendations. Acknowledging that only some of the many potential effects of climate change are quantifiable, it underlines increased deaths from thermal extremes and weather disasters, vector-borne diseases, a higher incidence of food-related and waterborne infections,

photochemical air pollutants and conflict over depleted natural resources. The WHO fact file, “10 Facts on Children’s Environmental Health,” summarizes environment-related causes and conditions of the nearly three million annual deaths of children under five years old, underlying the increased risk of children of injuries and death from floods and extreme temperatures, asthma and respiratory diseases due to air pollution, and diarrheal diseases, malaria, and malnutrition. [December 2009. [Military Implications, Sources](#)²¹²]

The World Health Organization is increasingly publishing articles that highlight the link between environmental conditions and health, such as the need to examine the spatial distribution of vector-borne diseases in relation to climate change, and design strategies that would help mitigate climate change while also improving human health. The *Feeling the Heat* report by Save the Children notes that climate change is the 21st century’s biggest global health threat to children, with impacts including: over 900 million children in the next generation to be affected by water shortages; 160 million more children to be at risk of catching malaria; and 175 million children a year to suffer the consequences of natural disasters such as cyclones, droughts, and floods by 2030. It warns that 250,000 children could die next year due to climate change (a figure that could reach 1 million by 2030). [November 2009. [Military Implications, Sources](#)²¹³]

Health Problems Heat Up: Climate Change and the Public's Health by the Trust for America’s Health warns that climate change will make Americans more vulnerable to diseases, disasters, and heat waves. According to the report, only five states have published a strategic climate change plan that includes a public health response, including planning for health challenges and emergencies expected to develop from natural disasters, pollution, and infectious diseases as temperatures and sea levels rise. The report includes several recommendations related to setting national guidelines and measures for core public health functions and funding for climate change planning and response, and special efforts to address the impact of climate change on at-risk and vulnerable communities. [October 2009. [Military Implications, Sources](#)²¹⁴]

WHO notes that while 37 of the least developed countries admit the link between population growth and climate change, only six of them identify family planning as part of their adaptation strategy. A study of the first 40 National Adaptation Programmes of Action (NAPAs) shows that only 7% of 448 projects across the 40 NAPAs were in the health sector. At the same time, *Lancet* notes that over 200 million women worldwide lack access to contraceptives. Remedying this, could prevent 76 million unintended pregnancies a year, reducing demographic pressure on the environment. A study by the London School of Economics estimates that \$7 spent on family planning would reduce carbon emissions by one ton, while low carbon technologies cost an estimated \$32 per ton reduced (\$24 for wind power, \$51 for solar, \$57-83 for coal plants with carbon capture and storage, \$92 for plug-in hybrid vehicles, and \$131 for electric vehicles).

Researchers warn of increased incidence of dengue fever, which sickens over 50 million and kills 24,000 worldwide every year. The main causes are population growth, increased traveling, and global warming disrupting the natural cold temperature processes that limit the population of dengue carrying mosquitoes. [September 2009. [Military Implications, Sources](#)²¹⁵]

ENERGY SECURITY

Energy Security Challenges for the 21st Century

Energy Security Challenges for the 21st Century: A Reference Book provides an “overview of the world’s energy system and the vulnerabilities that underlie growing concern over energy security”, as well as “various approaches energy producers, consumers and transit states have toward energy security and it examines the domestic and foreign policy tradeoffs required to ensure safe and affordable energy supply.” [September 2009. Military Implications, Source²¹⁷]

Energy Security Central to China’s Energy Plan

Although China is one of the world leaders in renewable energy production, its energy plan is still heavily relying on the more traditional energy sources of fossil fuels. While the benefits of renewable resources do include some relief for environmental issues like climate change, the focus of the Chinese energy plans seems to be energy security. Chinese energy legislation is expected to be approved in the fall. [June 2010. Military Implications, Sources²¹⁸]

PREVENTION AND ADAPTATION

New Flood Center to Develop Warning Systems

Professor Witold Krajewski of the University of Iowa has been named director of the new Iowa Flood Center, which has at the top of its agenda the development of prototype flood warning and forecasting systems to mitigate the effects of future floods. What the engineers and scientists learn is expected to enhance their overall understanding of floods and improve the accuracy of flood warning systems. [September 2009. Military Implications, Source²²⁰]

Global and Regional Initiatives

The Environment Council of the EU, which met on 11 June 2010 in Luxembourg, adopted conclusions on water scarcity, drought, and adaptation to climate change, as well as on preparing forests for climate change. The Council stressed inter-linkages of water scarcity and drought with climate change adaptation and biodiversity conservation, and the importance of exchanging experience and best practices with other partners. The Council also supported the development of a European drought observatory which is tasked to contribute to drought forecasting, assessment and monitoring as well as to the exchange of best practices on this issue.

The first World Congress on Cities and Adaptation to Climate Change was held May 28-30, 2010, in Bonn, Germany, under the theme “Resilient Cities 2010”. During the Congress, the UN Convention to Combat Desertification (UNCCD) and the FAO co-organized a session on “Ensuring food security through adaptation”, where participants discussed adaptation approaches for achieving food security including: diversifying and adapting local and traditional food; securing watershed management; and adapting supply-demand linkages for adequate food supply and processing. At the end of the Congress, members of the Mayors Adaptation Forum signed the Bonn Declaration of Mayors. The Declaration recognizes the failure of the UNFCCC COP

15 to deliver a strong and comprehensive post-2012 climate agreement and identifies ten action points, such as to prioritize local level adaptation strategies that support local sustainable development. [June 2010. [Military Implications, Sources](#)²²²]

The third edition of Global Biodiversity Outlook (GBO-3) highlights that the linked challenges of biodiversity loss and climate change must be addressed with equal priority and in close coordination. It confirms that the world has failed to meet its target to achieve a significant reduction in the rate of biodiversity loss by 2010. While listing climate change as one of the five principal pressures that drive biodiversity loss, the report also points out opportunities to address the biodiversity crisis while contributing to other social objectives, including the fight against climate change. It outlines a possible new strategy for reducing biodiversity loss, including addressing the underlying causes of its indirect drivers, such as patterns of consumption, the impacts of increased trade and demographic change, and ending harmful subsidies. The report was produced by the Secretariat of the Convention on Biological Diversity and the UNEP's World Conservation Monitoring Centre and is one of the key outputs of the 2010 International Year of Biodiversity.

A UN HABITAT conference on Promoting Green Building Rating in Africa was held May 4-6, 2010, in Nairobi, Kenya, with participants from 20 African countries. It adopted the Nairobi Declaration on Green Building for Africa, which sets a framework for strengthening the ability of cities to adapt to climate change by making use of local and naturally available energies and materials, and calls for establishing an African Network of Green Building Councils. [May 2010. [Military Implications, Sources](#)²²³]

At the UN International Strategy for Disaster Reduction (UN/ISDR) Second Ministerial Conference on Disaster Risk Reduction (DRR), held April 14-16, 2010, in Nairobi, Kenya, African Ministers adopted the Programme of Action for the Implementation of the Africa Regional Strategy for Disaster Risk Reduction (2006–2015) and a Ministerial Declaration. The Programme aims to mainstream risk reduction management and climate change adaptation as an integral part of sustainable development. The Ministerial Declaration calls on the AU Summit to make disaster risk reduction and adaptation to climate change a national education priority through integration into the educational system. The 2010 Economic Report on Africa, “Promoting High-level Sustainable Growth to Reduce Unemployment in Africa” warns that conflicts in the region will probably increase due to diminishing resources, and emphasizes the need for Africa to develop adaptation and mitigation strategies. Noting that the costs of adaptation and mitigation are beyond the means of African countries, the report calls on the international community to increase help for financing these strategies.

At the 16th summit of the Association of Southeast Asian Nations (ASEAN), held April 8-9, 2010, in Hanoi, Viet Nam, under the theme “Towards the ASEAN Community: from vision to action”, the leaders released a joint statement calling for a legally binding global pact on climate change and urged richer nations to provide them with ‘scaled-up’ financial help to combat climate change. The development of an ASEAN action plan to better understand and respond to climate change is also considered. [April 2010. [Military Implications, Sources](#)²²⁴]

The number of people around the world needing humanitarian assistance due to natural catastrophes triggered by climate change might increase from 250 million today to more than 375 million, by 2015. Therefore, the British Government announced that it would recommend a

doubling of the UN relief funds budget from the current \$500 million to \$1 billion, along with a reconsideration of the entire system.

The UNDP released a report titled “Screening Tools and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance – A Stocktaking Report” which summarizes existing tools and good practices from a range of organizations to guide development practitioners in their climate change mainstreaming efforts. The report provides a comparative overview of existing tools and guidelines, explores the components and entry points of the mainstreaming process, and presents definitions of key climate change adaptation and mainstreaming concepts.

The International Food Policy Research Institute (IFPRI) launched a new project, Global Futures for Agriculture, which will evaluate promising technologies, investments, and policy reforms to improve agricultural productivity and environmental sustainability in developing countries. The project will improve IFPRI’s International Model for Policy Analysis of Agricultural Commodities and Trade, focusing on regions most vulnerable to global changes over the next 30 to 50 years, with special attention on the rural poor and smallholder farmers. [March 2010. [Military Implications, Sources](#)²²⁵]

According to the World Bank, urban populations in areas with significant probability of major earthquakes will increase from 370 million to 870 million between 2000 and 2050. As a result, The World Institute of Development Economics Research of the UN University recommends that cities set up hazard management as an integral part of urban planning and management, not as a separate activity. [February 2010. [Military Implications, Sources](#)²²⁶]

The World Meteorological Organization (WMO) announced its ongoing work towards the establishment of a Global Cryosphere (global solid water system) Watch to serve societal needs for weather, climate and water, and related environmental information and services. The World Meteorological Congress, WMO’s supreme governing body, is to consider ways and means of developing and implementing a Global Cryosphere Watch at its next quadrennial session in 2011. Once established, a Global Cryosphere Watch should enhance the capability of the research community and operational services to predict the future state of the cryosphere and facilitate assessments of the cryosphere and its components on a regional to global scale to support climate change science, decision-making and formulation of environmental policy.

The Joint Session of the Executive Boards of the UNDP, UNFPA, UNICEF, and WFP held on January 15, 2010 focused on the issue of climate change. Noting that 40% of development investment from ODA and concessional lending is sensitive to climate risk, UNDP Administrator Helen Clark spoke on how the UN agencies can support countries in addressing the climate change challenge through their programmatic activities at the country level to support capacity building for adaptation and mitigation, and access to climate financing. She also said that the UN Development Group (UNDG) developed guidelines to support the UN Country Team on how to mainstream disaster risk reduction and environmental sustainability into the programmatic activities at the country level. Specific guidelines on climate change will be issued soon.

The UN Economic Commission for Europe (UNECE) released a study, “Transboundary flood risk management: experiences from the UNECE region,” which describes problems and progress made regarding transboundary flood management in 10 transboundary river basins in the UNECE region; tools for improving resilience against transboundary flood risk; and useful legal and institutional arrangements for cooperation.” The study also notes that climate change is

expected to increase both the magnitude and the frequency of floods, although there is considerable uncertainty. The study was prepared by the Task Force on Water and Climate, under the UNECE Water Convention. [January 2010. [Military Implications, Sources](#)²²⁷]

“Climate Change, Conflict and Fragility”. a new report by International Alert, advises that adaptation strategies should be conflict sensitive and international responses to disasters and conflict should take into account the interlinked nature of the problems. Peace-building, for example, needs to be climate-proofed by paying attention to the availability of resources such as water for agriculture which could be affected by climate change. Similarly, large amount of funds for adaptation given to vulnerable states could encourage warfare unless adequate attention is paid to the systems of power and political reality in these countries. Dan Smith, Secretary General of International Alert and co-author of the report, warned “there is an enormous risk that money will go astray and end up doing more harm than good.”

“Linking Climate Change Policies to Human Development Analysis and Advocacy” by UNDP aims to integrate human development analysis and advocacy into more equitable, sustainable and climate-resilient development planning and policy debates. The guidance note proposes a conceptual framework for the analysis and provides analytical data, policy and advocacy issues that can be adapted to regional and national contexts. [December 2009. [Military Implications, Sources](#)²²⁸]

The UN International Strategy for Disaster Reduction Secretariat (UNISDR) *2010-2011 Biennial Work Programme: Invest Today for a Safer Tomorrow* includes four strategic objectives: 1) accelerate the promotion of national coordination mechanisms for disaster risk reduction with the goal of including climate change concerns; 2) participate in UNFCCC processes; 3) promote joint adaptation and risk reduction measures in countries; and 4) increase global inter-agency coordination on risk analysis and risk reduction, as a tool for climate change adaptation. While the current strategic overview is for two years, the vision, targets, and strategic directions are forward looking to 2015. Key expected outcomes include improved knowledge, strategies, and political and financial commitments, as well as better coherence and coordination among international and regional actors to address climate-related risks.

In partnership with the IPCC, UNISDR is working on a special report, *Managing the Risk of Extreme Events and Disasters to Advance Climate Change Adaptation*, to be released in 2011, representing the first global scientific effort to examine the linkages between disaster risk reduction and adaptation to climate change.

A Declaration of ‘climate vulnerable’ States demands that the Copenhagen outcome document include adaptation finance mechanisms to address the needs of the most vulnerable countries, amounting to at least 1.5% of developed countries' GDP (in addition to the 0.7% for overseas development assistance) annually by 2015 to assist developing countries to make their transition to a climate-resilient economy and to address the health, human rights, and security implications of climate change, including communities' relocation and a legal framework to protect climate refugees. A follow-up Climate Vulnerable States Forum will be held in Kiribati in 2010.

The Economics of Ecosystems and Biodiversity for National and International Policy Makers; Summary: Responding to the Value of Nature assesses reasons and methods for measuring the value of ecosystems and includes a series of recommendations for improving decisions. It highlights that the ratio of benefits to costs for ecosystem protection ranges between

25-to-1 and 100-to-1. For example, expanding marine protection from less than 1% to 30% would cost about \$40-50 billion per year, whereas the annual benefit would be about \$4-5 trillion. “Recognizing and rewarding the value delivered to society by the natural environment must become a policy priority,” said The Economics of Ecosystems and Biodiversity study leader, Pavan Sukhdev.

The EU estimates that €100 billion (\$150 billion) a year by 2020 would cost-effectively address climate change. It estimates it would cost about €7 billion (\$10.5 billion) a year for the first three years to “fast-track” funding in the developing world. There is no agreement on who should pay what and if the contributions should be voluntary or mandatory, or linked to the “polluter pays” principle. Chancellor Angela Merkel reportedly said that the European and the U.S. shares should be around one-third each.

The *State of World Population 2009* report by the UN Population Fund focuses on the impacts of climate change on the most vulnerable - and poor women specifically. The report argues that the fight against climate change is more likely to be successful if decisions take into account the needs, rights, and potential of women. [November 2009. [Military Implications, Sources](#)²²⁹]

The Consultative Meeting of Parliamentarians from Central Africa, held October 17 in Chad, recognized the synergies between disaster risk reduction and adaptation, and concluded that disaster risk reduction measures should be a main adaptation tool to the effects of climate change that are already affecting many African countries. The Chair of the African Parliamentarian initiative on Climate Risk Reduction called for a common African position that would link climate change adaptation to disaster risk reduction. Participants to the Southern African Development Community annual emergency preparedness and response workshop held in Johannesburg, South Africa, also pledged to strengthen their ability to respond to natural disasters and reduce risks on their populations. The SADC Secretariat will set up a regional disaster risk reduction unit that will provide leadership and coordination for early warning and disaster risk reduction to SADC member States. At the World Forum on Sustainable Development held October 9-11, 2009, in Ouagadougou, Burkina Faso, under the theme “Climate Change: What Opportunities for Sustainable Development?” African leaders emphasized that climate change adaptation policies and development strategies in the region should be integrated. They also called for the acceleration of the creation of a department for African environmental programs at the African Bank of Development, with a special fund to be contributed mainly by the developed countries. It was also decided that Africa speaks with one voice at the Copenhagen climate summit, including the demand for a compensation to be paid by major polluters, estimated at \$65 billion dollars.

Managing our coastal zone in a changing climate: the time to act is now, a report by the Australian House of Representatives Climate Change, Water, Environment and the Arts Committee, is a comprehensive analysis of the impact of climate change on Australia. The report highlights the importance of the issue since 80% of Australia’s population lives in the coastal zone. It recommends new coastal management measures, based on national leadership in a collaborative framework with state and local governments and communities. [October 2009. [Military Implications, Sources](#)²³⁰]

The “World Economic and Social Survey 2009” calls for a ‘Global New Deal’ at the scale of \$500-600 billion, compared to the ‘woefully inadequate’ estimated \$21 billion currently

allocated internationally for climate change adaptation and mitigation plans. The report presents a range of possible multilateral measures in support of a global investment program, including a global clean energy fund, a global feed-in tariff regime in support of renewable energy sources, and a more balanced intellectual property regime for aiding the transfer of clean technologies. The Christian Aid report “Community Answers to Climate Chaos” estimates that rich countries’ overall annual contribution to a proposed Sustainable Development Innovation Facility should be over €10 billion (\$161 billion) to help local communities cope with climate change effects.

Similarly, the World Bank’s “World Development Report 2010: Development and Climate Change” estimates that by 2030, developing countries will need \$75 billion annually for adaptation, and another \$400 billion for low-carbon technology development. The report notes that poor nations will bear between 75-80% of the cost of floods, increased desertification and other disasters caused by global warming. Countries in Africa and South Asia are slated to lose as much as 5% of their GDP if temperatures rise just 2°C above pre-industrial levels. The WDR 2010 focuses on the many dimensions of development that are affected by climate change, including: reducing human vulnerability; managing land and water; stimulating development without compromising the climate; harnessing and efficiently using funds for mitigation and adaptation; accelerating the spread of “climate-smart” technologies; and communicating climate change issues to societies.

The World Climate Conference-3 held in Geneva, August 31–September 4, 2009, under the theme “Better climate information for a better future” decided to establish a Global Framework for Climate Services, to improve science-based climate prediction services and long-range seasonal weather projections. This will be an important tool for policymakers in general and for developing nations most vulnerable to the impact of global warming, specifically.

The “Lomé Declaration on Climate Change and Protection of Civilians in West Africa,” adopted at the Regional Conference on Protection Challenges to Climate Change in West Africa, from 14-16 September 2009, in Lomé, Togo, calls for broader consideration of the social impacts of climate change through a human rights-based approach. Participants underscored conflicts arising from natural resource depletion and the infringement of displaced people’s rights. They also recommended establishment of a special fund to help address climate change-induced impacts on affected parts of the population; called for measures to protect climate-affected persons; and agreed that a regional platform should be established for information exchange. [September 2009. [Military Implications, Sources](#)²³¹]

The United Nations is setting up a Global Impact and Vulnerability Alert System to help poorer countries such as those in the Pacific region deal with the combined effects of the global economic crisis and climate change. “Mitigation and adaptation must both be our urgent priorities,” said UN Secretary-General Ban Ki-moon in a message to the 40th Pacific Leaders Forum in Cairns, Australia.

The study *Assessing the costs of adaptation to climate change: A critique of the UNFCCC estimates* reveals that the real costs are likely to be 2-3 times greater than the estimates by the UN Framework Convention on Climate Change (UNFCCC). Among other things, the UN estimates didn’t include key sectors such as energy, manufacturing, tourism, and natural ecosystems. The UNFCCC estimates are \$40 billion to \$170 billion a year until 2030. Pointing out that some existing studies already suggest that costs will be considerably higher, the study calls for detailed case studies of what adaptation costs would be.

Reportedly, a draft resolution by African leaders will ask rich nations for \$67 billion per year to help them cope with the impacts of global warming. The draft resolution is prepared for the summit to be held in December, at Copenhagen.

The UN International Strategy for Disaster Risk Reduction (UN/ISDR) warns that the frequency of landslides is expected to increase as climate change increases the intensity of rainfall. Actions such as building early warning systems to alert people living in landslide-prone areas are necessary to reduce impacts, says UN/ISDR. [August 2009. [Military Implications, Sources](#)²³²]

The Intergovernmental Panel on Climate Change (IPCC) will produce a manual for policymakers and organizations working in disaster relief to help build short-term strategies for managing extreme weather event effects and bolstering resilience, as well as to promote adaptation to global warming.

The UN International Strategy on Disaster Reduction (UN/ISDR) urged the G8 Summit to apply their “considerable influence, resources and political will” to advance five major action points on disaster risk reduction: helping disaster-prone countries institutionalize disaster risk reduction; promoting effective measures to reduce the number of people living with chronic food insecurity; ensuring the research needed at all levels to develop, disseminate and apply climate forecast information, early warning systems, and ecosystem essentials; enabling expeditiously a global structural and functional assessment of all schools and hospitals; and making unequivocal financial commitments to disaster risk reduction. [July 2009. [Military Implications, Sources](#)²³³]

CLIMATE MODELING

Climate Projection Models

An International Conference on Post-Kyoto Climate Change Mitigation Modeling gathered about 450 people — experts in modeling as well as students — to introduce developments of greenhouse gas reduction modeling and foster international cooperation and networking for improving GHG reduction analysis models. It was agreed that the models should factor in new developments in technical innovation, changes in lifestyle, and energy security and energy systems. Military and security experts participating at a conference organized by the Scripps Institution of Oceanography’s new Center for Environment and National Security agreed that the Defense Department has to negotiate directly with climate modelers to get the future forecasts it needs. NOAA’s next-generation climate models are expected to incorporate knowledge of the social sciences, agriculture, and marine ecosystems, and highlight not only potential changes, but also which might be the plausible consequences. It was also highlighted that there is a gap between the way scientific data is presented and the real needs of the defense organizations. [June 2010. [Military Implications, Sources](#)²³⁵]

Prof Dirk Helbing of the Swiss Federal Institute of Technology in Zurich has outlined a plan for a “Living Earth Simulator” that would use economic, environmental, and health data to create a model of the entire planet in real time. The project would gather detailed data about the planet and human activities, use it to simulate the behavior of whole political, social, and economic

systems, and then make predictions to prevent crises from occurring. He also envisions ‘situation rooms’ from which global leaders could manage crises as they were going on. [May 2010. [Military Implications, Sources](#)²³⁶]

New projections by the World Meteorological Organization for tropical cyclones until the end of the century show that although there will be fewer storms in number, they will be stronger and carrying more rain, therefore more damaging. Overall strength of storms measured in wind speed would rise by 2-11%; an 11% increase in wind speed translates to roughly a 60% increase in damage. Another study, analyzing only the Atlantic hurricane basin, predicts double the number of category 4 and 5 hurricanes, and a 28% increase in damage near the U.S.

Simulation models developed by Keith Cherkauer, affiliated with the Purdue Climate Change Research Center and the Center for the Environment in Discovery Park, show that Indiana, Illinois, Wisconsin and Michigan could receive 28% more precipitation by the year 2070, with most of it in winter and spring, while summer and fall seasons could be drier. He used three different scenarios based on different amounts of carbon emissions. The results also showed that by 2077, in the four states, winters could be 2.7°F to 5.4°F warmer and summers 3.6°F to 10.8°F warmer than today. Using the Variable Infiltration Capacity Model—which simulates how precipitation moves through land surface environments—he predicted stream flow for six rivers: the Chippewa, Wisconsin, Illinois, Wabash, Grand, and Rock Rivers. [February 2010. [Military Implications, Sources](#)²³⁷]

Scientists from NOAA, combining three models into one tool, were able to simulate with higher accuracy storms’ evolution and categories across the Atlantic. They found that by the end of the century, although storms will in general decrease in number, they will be more powerful; category 4 (210-249 kilometers per hour) and category 5 (over 250 kilometers per hour) will double in frequency. The hardest hit will be Haiti and the Dominican Republic, the Bahamas and the northeastern coast of the U.S. These results corroborate results of other climate models. [January 2010. [Military Implications, Sources](#)²³⁸]

A newly revised NASA model trying to address the complexities of atmospheric chemistry, suggests that some greenhouse gases have considerably stronger warming effects than previously estimated. When the hydroxyl-consuming effect is factored in, methane’s planet-warming potential is about 28 times more than that of CO₂ (compared to 25 times shown by previous studies), while carbon monoxide’s greenhouse warming potential rises from 2.2 times to 3.3 times that of CO₂. It further finds that their greenhouse effect increases even further if their inhibiting influence on the formation of planet-cooling clouds is incorporated into the model. The new finding, published in the October 29 *Science*, reveals the difficulty of making long-term climate predictions under various emissions scenarios. However, the model can help policymakers better assess the potential climatic effects of specific types of emissions and design reduction targets accordingly.

Recent discoveries reveal that it took only six months to plunge Europe into the last ice age. The research, conducted by William Patterson from the University of Saskatchewan in Saskatoon, Canada, using mud deposits from Lough Monreagh lake in western Ireland, shows that 12,800 years ago, most probably due to a sudden slowdown of the Gulf Stream, the northern hemisphere was plunged into a mini-ice age that lasted for 1,300 years. Professor Tim Lenton from the University of East Anglia notes, “In the period from 65,000 to 10,000 years ago there

were periods of abrupt warming and cooling roughly every 1,500 years, when the temperature in Greenland might fall or rise by 10°C (18°F) in a decade.” [November 2009. [Military Implications, Sources](#)²³⁹]

Climate-Rapid Overview and Decision Support Simulator (C-ROADS) is a new climate change model, developed by the Sustainability Institute, aiming to help policymakers assess the greenhouse gas emissions implications of their strategies. The forecasts show that unless all nations take dramatic steps to reduce greenhouse gas emissions, temperature and sea level rises will be unacceptably high by the end of the century.

Scientists participating at the conference Climate Forcing of Geological and Geomorphological Hazards, September 15-17, 2009, outlined evidence that global warming could cause geological disturbances, which can result in earthquakes, tsunamis, avalanches, and volcanic eruptions. Although linking earth’s sensitivity to climate is only emerging and more data is needed to build predictive climate models linking the two systems, the evidence is there, say scientists. [September 2009. [Military Implications, Sources](#)²⁴⁰]

A computer model developed by the Australian Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation has confirmed for the first time that there is a link between southeast Australia’s changed weather patterns—decline in rainfall (drought)—and rising levels of greenhouse gases, aerosols, and ozone depletion. [August 2009. [Military Implications, Sources](#)²⁴¹]

For the first time, researchers have constructed a model that combines the impact on global temperature of four factors: human influences such as CO₂ and aerosol emissions; heating from the sun; volcanic activity; and the El Niño southern oscillation. The analysis shows that the relative stability in global temperatures in the last seven years is due primarily to a decline in incoming sunlight associated with the 11-year solar cycle, and a weak El Niño, which therefore masked the real warming effects caused by CO₂ and other greenhouse gases. The research was carried out by Judith Lean, of the US Naval Research Laboratory, and David Rind, of NASA's Goddard Institute for Space Studies and will be published in *Geophysical Research Letters*. [July 2009; [Military Implications, Sources](#)²⁴²]

Scenarios

A new scenario developed by Climate Analytics to the request of Greenpeace Switzerland is forecasting global warming by considering the Swiss climate policy model at world level and linearly extending the policy trend up to 2020 to 2100. By these assumptions, global emissions peak at 60 Gt CO₂ in the 2050s, and drop below 50 Gt CO₂ by 2100. The best-estimate global warming in this scenario is 1°C by 2020, 1.8°C by 2050 and 3°C above pre-industrial by 2100. [December 2009. [Military Implications, Sources](#)²⁴³]

The World Wide Fund for Nature (WWF) report *Climate Solutions II* warns that the world has only five years to switch to low-carbon reindustrialization and avoid the point of no return estimated to be in 2014. The report considers two scenarios of emission cuts by 2050 relative to 1990 levels: one of 63% cuts, and another of 80%. It finds that clean, low-carbon industries

would need to grow at least 22% a year for the 63% reduction scenario to be achieved, and at least 24% a year for the 80% reduction scenario to be achieved. According to the report, the estimated short-term investment to achieve these goals is between \$7 trillion and \$17 trillion. [October 2009. [Military Implications, Sources](#)²⁴⁴]

C. Protecting the Environment Due to Its Inherent Moral Value ²⁴⁵

ENVIRONMENTAL SECURITY-RELATED INTERNATIONAL REGULATIONS THAT HAVE BEEN OR ARE CLOSE TO COMING INTO FORCE SINCE JULY 2008

AQUATIC ENVIRONMENT

Draft European Transboundary Guidance on Water and Adaptation to Climate Change

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) of the UN Economic Commission for Europe (UNECE) is preparing a draft Guidance on water and adaptation to climate change, the first of its kind looking at adaptation from a transboundary perspective. The Guidance will cover impacts of climate change on water quantity and quality, assessment of risks, and addressing vulnerability and adaptation strategies in the UNECE region and beyond. The draft Guidance will be submitted to the fifth session of the Meeting of the Parties to the Water Convention, to be held November 10–12, 2009 in Geneva. [September 2009. Military Implications, Sources²⁴⁷]

UNECE Guidance on Water and Adaptation to Climate Change

The fifth meeting of the parties to the United Nations Economic Commission for Europe (UNECE) Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) was held November 10-12, 2009 in Geneva. It adopted the Guidance on Water and Adaptation to Climate Change to help address the impacts of climate change on transboundary freshwater. The Guidance provides an overview of multilateral agreements related to water issues, and an interdisciplinary methodology on how to develop and implement an adaptation strategy in a transboundary context, as well as recommendations to decisionmakers and water managers on how to assess impacts of climate change on water quantity and quality, perform risk and vulnerability assessments, and design and implement appropriate adaptation strategies. It also contains about 40 case studies. [November 2009. Military Implications, Source²⁴⁸]

EPA Issues New Regulations on Water Pollution from Construction

The Environmental Protection Agency has issued a final rule to be phased in over four years to help reduce water pollution from construction sites. Builders must use best management practices to ensure that construction activity does not pollute nearby bodies of water; and, for larger projects, they must also monitor discharges and ensure they comply with specific limits. [November 2009. Military Implications, Sources²⁴⁹]

Marine Environment

UN Treaty on Maritime Goods Transportation Opened for Signature

The new UNCITRAL Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea, known as the “Rotterdam Rules”, provides a legal framework governing the international carriage of goods by sea and industry practices. 90% of world trade travels in part by ocean transport. The Convention sets clear global rules for rights and obligations, liability and redress of all parties involved in shipping goods by sea. Adopted by the General Assembly in December 2008, the Rotterdam Rules opened for signature on September 23, 2009 and need 20 ratifications for entry into force. To date, it already has 20 signatories (including the U.S.) representing over 25% of current world trade volume. [October 2009. Military Implications, Sources²⁵¹]

Work Plan for Reducing Greenhouse Gas Emissions from Ships

The Marine Environment Protection (MEP) Committee of the International Maritime Organization (IMO) agreed to an interim package and a work plan aiming to reduce greenhouse-gas emissions from shipping. The procedures do not set any CO₂ reduction rates, and include only voluntary technical and operational measures to reduce emissions. The measures have a trial status until the MEPC 60th session, to be held in March 2010, when they will be adapted as necessary. The Second IMO study on GHG emissions estimates that the shipping industry was responsible for 3.3% of the 2007 global emissions, and, if no global policies are adopted to regulate shipping emissions, by 2050 they might increase by 150% to 250% compared to 2007 levels. However, implementing technical and operational measures could increase efficiency and reduce emissions by 25% to 75% below the current levels. [July 2009. Military Implications, Sources²⁵²]

Chemicals and other Hazardous Compounds

Kiev Protocol to Aarhus Convention Enters into Force in October 2009

The Kiev Protocol on Pollutant Release and Transfer Registers to the UNECE Aarhus Convention (Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters) will enter into force on October 8, 2009, 90 days after receiving its 16th ratification (France, on July 10, 2009.) The Kiev Protocol is a legally binding international instrument among European countries regulating information on pollutants’ release and transfer, with the objectives of enhancing public access to information, assessing progress and priority areas for pollution reduction, and monitoring compliance with certain international agreements. It requires facilities to report annually on the amounts of certain pollutants they release to the environment or transfer to other facilities. The EU-27 countries are expected to release their first annual reports on the pollutants covered by the Protocol on September 30, 2009. [July 2009. Military Implications, Sources²⁵⁴]

Two New Pesticides Added to the Rotterdam Convention on the Prior Informed Consent (PIC) Watch List

Endosulfan and azinphos-methyl were added to the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

watch list by the Chemical Review Committee. Endosulfan is a persistent organic pollutant (POP), while azinphos-methyl is derived from nerve agents developed during World War II. Both pesticides have been linked to reproductive and developmental damage in humans and animals. [March 2010. Military implications, Sources²⁵⁵]

EU Restrictions on Nanofoods Expected to Pass in July

The Committee on Environment, Health and Consumer Protection of the European Parliament has voted (42-2-3) in favor of excluding products containing nanoparticles from the EU list of novel foods allowed on the market. The action also included a declaration that food produced from nanotechnology processes must undergo risk assessment before being approved for use and must be labeled on packaging. A final plenary vote on the measure is expected to take place in the European Parliament in July. [June 2010. Military Implications, Source²⁵⁶]

Energy

International Renewable Energy Agency Statute Enters into Force on 8 July 2010

The International Renewable Energy Agency (IRENA) Statute has received its 25th ratification and therefore IRENA will become a full-fledged international organization on 8 July 2010. Helen Pelosse, IRENA Interim Director General, underlined that IRENA's ratification process was the fastest ever for such a process. IRENA's objective is to promote a swift transition towards sustainable use of renewable energy. By the end of June 2010, a total of 144 countries and the European Union have signed IRENA's mandate, and 26 countries have ratified it. [Related item: *New International Renewable Energy Agency Opens in January*, in December 2008 environmental security report] [June 2010. Military Implications, Source²⁵⁷]

Polution

EPA Proposes Tougher Air-Quality Rules

The EPA tougher National Ambient Air Quality Standards proposal sets a primary standard for ground-level ozone at no more than 0.060 to 0.070 parts per million (measured over eight hours), to be phased in over the next two decades (extended for regions with highest smog pollution). A secondary smog standard is proposed to protect the environment, especially plants and trees. [Related item: *EPA Warnings on Various Potential Health Hazards* in October 2009 environmental security report.] [January 2010. Military Implications, Sources²⁵⁸]

Waste Management

Waste Reduction and Recycling Regulations and Laws Spreading Around the World

Australia's Department of the Environment, Water, Heritage and the Arts released the draft "National Waste Policy Framework—Less Waste More Resources," aiming to reduce waste by increasing its use as a resource. In the U.S., the city of San Francisco is the latest community to

enact a compulsory composting/recycling law, joining a growing worldwide group of jurisdictions having such regulations. [Previous related items: *European Union to Consider Regulations for Curbing Biowaste* in June 2009, and *EU New Strategy on Waste Recycling in December 2005* environmental security reports.] [July 2009. Military Implications, Sources²⁵⁹]

India Further Loosens Already Lax Rules on Waste Importing

Illegal waste shipping to India might worsen due to new amendments made by the Ministry of Environment and Forests to the Hazardous Wastes Rules. While previous rules allowed only ‘recyclers’ to bring in certain waste, the new amendments will also allow ‘traders’ to do so, making control and enforcement potentially more difficult. This could be an additional factor increasing India’s pollution; threatening its already precarious environment, health conditions, and falling water tables. [Related items: *Hazardous Waste Disposal of Increasing Concern* in September 2009 and other previous environmental security reports.] [April 2010. Military Implications, Sources²⁶⁰]

PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES

Aquatic Environment

Increased Protection Needed for the Marine Environment

The East Asian Seas region has some of the world’s highest concentrations of shipping and fishing vessel activity, accounting for 50% of global fisheries production and 80% of global aquaculture production. The UNEP report “The East Asian Seas State of the Marine Environment” warns that the coastal habitats and ecosystems are experiencing stress due to pollution, alien invasive species and other factors, which could negatively impact the region’s economy. Nearly 75% of the region’s population depends directly or indirectly on coastal areas, and 80% of the region’s GDP is linked to coastal natural resources. Already, 40% of coral reefs and 50% of mangrove swamps have been lost. Coral reefs generate an estimated \$112.5 billion and mangrove habitats \$5.1 billion annually. Unless adequate environmental regulations are adopted and marine environment factored into economic planning, increasing poverty might add to social unrest and migration.

According to a study by researchers at Carnegie Institution published in the journal *Nature Geoscience*, the current rate of ocean acidification is up to 10 times faster than 55 million years ago—the last time deep oceans were so acidic. The main cause is considered to be the rapidly rising concentration of CO₂ in the atmosphere. Scientists warn that if present trends continue, some marine life is threatened with extinction, while coral reefs will begin to disintegrate before the end of the century. Coral bleaching is already damaging many reefs worldwide. [February 2010. Military implications, Sources²⁶³]

Proliferation of Sensors in and on Oceans Requires an International Legal Framework, but Might Affect Freedom to Conduct Ocean Research

The Argo Project is an array of 3,255 (as of March 23, 2010) free-floating seawater quality monitoring devices supported by 46 nations. It operates in the framework of WMO (World

Meteorological Organization) Integrated Global Observing Systems since 2007, and contributes to the Global Earth Observation System of Systems (GEOSS) with Guidelines adopted in June 2008. There are controversies over information collection systems and sometimes violations of exclusive economic zones. The results of these controversies might determine the evolution of the debate among scientists and diplomats over freedom of conducting oceanic research. Deploying new technologies on the high seas is sometimes seen as conflicting with regulations protecting coastal states' sovereign rights. The 43rd session of the Intergovernmental Oceanographic Commission Executive Council meeting in June is expected to address issues of relevance to the "soft-law guidelines or codes of conduct" and the legal regulations affecting the scientific work of several environmental early warning systems. [April 2010. Military Implications, Sources²⁶⁴]

Better Planning Needed for Maritime, Especially Coastal, Areas

Dr. Jane Lubchenco, head of the U.S. National Oceanic & Atmospheric Administration (NOAA), has called for better planning for use of ocean waters, especially along coasts, citing the myriad, and often conflicting activities that are putting pressure on that environment. A team led by marine ecologists at the National Center for Ecological Analysis and Synthesis (NCEAS) at the University of California, Santa Barbara produced a composite map of the status of West Coast marine ecosystems, plotting the location and intensity of 25 human-derived sources of ecological stress. This provides important information on the impact of the activities and their sustainability or potential relocation. The effort represents a methodological refinement of an earlier globally oriented assessment. [Related item: *World Database on Marine Protected Areas* in June 2009 environmental security report.] [July 2009. Military Implications, Sources²⁶⁵]

Factors to Consider in Establishing and Operating Marine Protected Areas

Although the number of marine protected areas increased over the past years, the world is still far from the commitment that by 2012, 10%-30% of waters will be protected. Scientists now warn that in order for the protection to be efficient, marine protected areas, which currently limit fishing in 1.6% of the waters claimed by countries, need to be located in the right spots. [March 2010. Military Implications, Source²⁶⁶]

EPA Plan for Reducing Ship Emissions

The U.S. Environmental Protection Agency is working on plans to reduce harmful emissions from ships, primarily nitrogen oxides (NOx) and particulate matter (PM). The organization is proposing to use the Clean Air Act to set engine and fuel standards for U.S.-flagged ships to bring them in line with international standards. When fully implemented, the coordinated effort would reduce NOx emissions by 80% and PM emissions by 85%. Meantime, California air-quality regulators have begun enforcing emission rules on ships within 24 miles of the coast. [July 2009. Military Implications, Sources²⁶⁷]

Biodiversity

International Body to Monitor Biodiversity Destruction

The Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) will be an international body to monitor and curb the destruction of biodiversity. It is modeled on the Intergovernmental Panel on Climate Change (IPCC), which helped raise climate change on the international and national agendas and trigger changes. The establishment of the new body was agreed to by governments meeting in Busan, South Korea, and has to be approved by the UN General Assembly's 65th session, which opens in September, and then presented for endorsement by environment ministers attending the UNEP Governing Council/Global Ministerial scheduled to be held in February 2011, in Nairobi, Kenya. [Related item: *New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties* in May 2008 environmental security report.]

Meantime, UNEP released the first issue in its new Policy Series on Ecosystem Management, "Integrated Solutions for Biodiversity, Climate Change and Poverty." It highlights, inter alia, the importance of biodiversity in adaptation to climate change and the need for a new strategy to increase engagement of business leaders to improve biodiversity protection. [June 2010. Military Implications, Sources²⁶⁹]

New Measures to Continue the Fight against Biodiversity Loss

The summit of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) decided to include several reptiles and amphibians in its endangered species trade list—some species of iguanas, an entire genus of tree frogs from Central America, and Kaiser's newt salamander from Iran. In the meantime, the EU, admitting to have missed the target of stopping biodiversity loss by the end of 2010, decided to set two new targets: a mid-term one that all species loss within the EU be ended by 2020, and a long-term target to protect and restore all ecosystems by 2050 to prevent future losses. [March 2010. Military implications, Source²⁷⁰]

Recommendations for Strengthening the Convention on Biological Diversity

The 14th meeting of the Convention on Biological Diversity's Subsidiary Body on Scientific, Technical and Technological Advice and the 3rd meeting of the CBD Working Group on Review of Implementation of the Convention adopted several recommendations to be considered by the Convention's review conference to be held in October 2010, in Nagoya, Japan. The recommendations include a Strategic Plan for the period 2011-2020 to halt (or reduce the rate of) biodiversity loss (although some argue that 2050 would be a more realistic timeline.) Debates continue on the legal nature and institutional aspects of a possible biodiversity technology initiative, as well as the role of intellectual property rights in technology transfer. It was also agreed that the COP invite the UN General Assembly to consider declaring 2011-2020 the United Nations Decade on Biodiversity. [May 2010. Military implications, Source²⁷¹]

International Year of Biodiversity is 2010 and Convention on Biological Diversity COP10 to Meet in Japan This Year

The year 2010 is designated as the International Year of Biodiversity by the United Nations. A panoply of events is planned to take place around the world for raising awareness and generating

public pressure on leaders to develop new mechanisms to curb loss of the world's species due to human activity (estimated by some experts at 1,000 times more than natural evolution). Scientists and officials agree that methods are needed to price the impact of decisions on biodiversity and set policies that will help create a better balance. The international community is expected to agree on some post-2010 goals on biodiversity at the COP10 of the Convention on Biological Diversity to be held October 18-29, in Nagoya, Japan. [January 2010. Military Implications, Sources²⁷²]

Scientists Say Dolphins Should Be Treated As 'Non-Human Persons'

New study of dolphins' behavior, backed up by anatomic research, has led scientists to declare dolphins second to humans in intelligence and suggesting that they should be treated as "non-human persons". [Related item: *Greenhouse Gas Emissions Increase Ocean Noise Pollution* in December 2009 environmental security report.] [January 2010. Military Implications, Source²⁷³]

Chemical and Biological Safety

First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination

As part of the UN's effort to improve coordination, reduce overlaps, and improve enforcement of multilateral environmental agreements, the first simultaneous extraordinary meetings of the Conferences of the Parties to the Basel (control of transboundary movement of hazardous waste), Rotterdam (prior informed consent for certain hazardous chemicals), and Stockholm (on POPs) Conventions, will be held February 22-26, 2010, in Bali, Indonesia, in coordination with the UNEP 11th Governing Council/Global Ministerial Environment Forum. The Synergies Oversight Team, composed of the Executive Secretaries of the three Conventions and representatives of UNEP and FAO, is coordinating the preparation of the simultaneous ExCOPs, while also assessing synergies in a strategic and long-term perspective. In a preamble to the conference, UNEP and FAO have launched a website that presents updated information on the ExCOPs: <http://excops.unep.ch>. Incidentally, the Basel Convention Committee has recently released a practical guide on national reporting by parties to the Basel Convention. [Related item: *UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance* in February 2007 environmental security report.] [October 2009. Military Implications, Sources²⁷⁵]

The first simultaneous extraordinary meeting of the Conferences of the Parties to the Basel, Rotterdam, and Stockholm Conventions (ExCOPs) to foster synergies among the three main conventions addressing hazardous chemicals and waste was held in Bali, Indonesia, February 22-24, 2010. The synchronization includes all main aspects, ranging from joint activities, management, and services, to budget cycles and audits, as well as a review mechanism and follow-up work on enhancing coordination and cooperation among the three conventions. The negotiations' results are stipulated in the omnibus decision simultaneously adopted at the final plenary by the COPs of all three Conventions. This could be a test case for improved global environmental governance by increasing coherence in decisionmaking and monitoring at international, regional, and national levels. Reform of the international system of environmental governance was further discussed as a key theme at the 11th Special Session of the UNEP

Governing Council/Global Ministerial Environment Forum (GCCS-11/GMEF), held February 24–26 (the outcomes were not yet available at the time of this writing.) [Related item: *UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance* in February 2007 environmental security report.] [February 2010. Military Implications, Sources²⁷⁶]

Preparations for a Legally Binding Global Instrument on Mercury Advance

The First Meeting of the Intergovernmental Negotiating Committee to Prepare a Global Legally Binding Instrument on Mercury was held from June 7-11, 2010 in Stockholm, Sweden, attended by over 400 participants, representing governments, UN agencies, and intergovernmental and non-governmental organizations. This first meeting consisted of initial exchanges of views on key elements of a convention, with the most important outcome being the request to the Secretariat for significant intersessional work, including the “elements of a comprehensive and suitable approach” to a legally binding instrument, which will be a basis for negotiations at the next meeting to be held January 24-28, 2011, in Chiba, Japan. [Related items: *UNEP Conference Furthers Environmental Governance* in February 2009, and *EU Legislation Banning Mercury Exports in Effect in 2011* in October 2008 environmental security reports.] [June 2010. Military Implications, Sources²⁷⁷]

Biosafety Protocol Advances

The second meeting of the Friends of the Co-Chairs on liability and redress in the context of the Cartagena Protocol on Biosafety, held February 8-12, 2010, in Putrajaya, Malaysia, focused on international rules and procedures for damage resulting from transboundary movements of living modified organisms (LMOs), including a supplementary protocol on liability and redress, civil liability, and capacity-building measures. Although not concluding a supplementary protocol, significant progress was made on several of the most contentious issues, including the elaboration of a legally binding provision on civil liability. Outstanding issues include language, terminology, and financial security. The first drafts of the supplementary protocol include a provision for exemptions in case of acts of God or force majeure, and war or civil unrest, and parties’ right to provide other exemptions or mitigations in their domestic law, as necessary. The negotiations will continue in June 2010, so that the supplementary protocol can be adopted at the 5th meeting of the Conference of the Parties (COP/MOP5) to the Biosafety Protocol, to be held in October 2010 in Nagoya, Japan. Reviews, if necessary, would be at five years (after its coming into force.) Note: UNEP Year Book 2010 remarks that biodiversity changes due to human activities in the past 50 years were the most significant in human history. The IUCN Red List shows that 17,291 species out of 47,677 assessed are under threat: 21% of mammals, 70% of plants, 37% of freshwater fish, 35% of invertebrates, 30% of amphibians, and 12% of birds. [February 2010. Military Implications. Sources²⁷⁸]

Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons

About 500 participants from 95 countries, UN organizations such as WHO, FAO and the World Organization for Animal Health (OIE), regional disease surveillance organizations, academic institutions, NGOs, and corporations participated in the 2009 Meeting of Experts from States Parties to the Biological Weapons Convention in Geneva, August 24-28. The meeting focused on

international cooperation for fighting infectious diseases, while also discussing peaceful uses of advances in bioscience and the establishment of mechanisms for promoting the implementation of the Convention's Article X on scientific and technological cooperation related to "bacteriological (biological) agents and toxins for peaceful purposes." The results of the meeting will be considered for the Meeting of States Parties, to be held December 7-11, 2009. Although in force since 1975, the treaty has no verification or compliance monitoring provisions or organization. According to the report *Ensuring Compliance With the Biological Weapons Convention*, some biodefense research might violate member-states commitments to the BWC. Along the same lines, *New Approaches to Biological Risk Assessment*, published by the British Royal Society and the International Council for the Life Sciences, calls for a harmonized international and inter-sectoral system to assess the "full spectrum" of bio-threats—ranging from naturally occurring diseases to accidental or intentional misuse of biological materials. The report acknowledges the difficulties generated by the variety of hazards and the limited data available on some threats. Reportedly, a meeting at the White House on August 13 represented the first in a series of meetings with biological experts for strengthening the strategy on bioterrorism, including inputs for the BWC and its 2011 review conference. [August 2009. *Military Implications, Sources*²⁷⁹]

No Enforcement Mechanism Proposed for Strengthening the Bioweapons Treaty Due to "rapidly changing nature" of the threat

The 2009 Meeting of States Parties to the Biological Weapons Convention was held in Geneva, December 7–11, with focus on promoting capacity-building in the areas of disease surveillance, detection, diagnosis, and containment of infectious diseases. The new National Strategy for Countering Biological Threats presented by the U.S., although a comprehensive document designed to strengthen the Convention, doesn't propose any international monitoring or enforcement system. A binding treaty on verification "would not be able to keep pace with the rapidly changing nature of the biological weapons threat," noted Undersecretary of State Ellen Tauscher. [December 2009. *Military Implications, Sources*²⁸⁰]

Chemicals Management to Address Emerging Technologies-related Issues

The Secretariat of Strategic Approach to International Chemicals Management (SAICM) released an update on current emerging policy issues related to: nanotechnologies and manufactured nanomaterials, hazardous substances within the life cycle of electrical and electronic products, chemicals in products, and lead in paint. These were adopted by Resolution II/4 at the second session of the International Conference on Chemicals Management. SAICM, in collaboration with OECD and the UN Institute for Training and Research (UNITAR), will organize during 2010 a series of regional informative workshops on potential applications and risks associated with nanotechnologies and nanomaterials, as well as capacity assessment, and awareness building. Submissions for emerging policy issues are welcome and would be considered at the next Conference, scheduled for June 2012. [September 2009. *Military Implications, Sources*²⁸¹]

International Gene Synthesis Consortium Created for Increasing Biosecurity

Five companies that represent about 80% of global gene synthesis capacity have formed the International Gene Synthesis Consortium for increasing the security of their products, preventing

misuse of gene synthesis technology, and helping to prevent bioterrorism and the use of manufactured DNA sequences in producing lethal disease agents. The Consortium's "Harmonized Screening Protocol for Gene Sequence & Customer Screening to Promote Biosecurity" creates a framework for safe use of synthetic genes covering aspects related to: screening of transactions and customers, record keeping, and regulatory compliance. In the meantime, the International Association of Synthetic Biology finalized the Code of Conduct for Best Practices in Gene Synthesis, and the World Intellectual Property Organization (WIPO) held a 'Symposium on Future Challenges of International Law: The Way Forward in Patenting Biotechnology' on November 25, 2009, to address the challenging interface between biotechnology, intellectual property rights, and international trade (the outcomes were not yet available at the time of this writing.) [November 2009. Military Implications, Sources²⁸²]

Insecticide Ingredient Deet May Be a Neurotoxin

Deet (N,N-diethyl-3-methylbenzamide, aka N,N-diethyl-meta-toluamide) might be a toxin to the human central nervous system, as revealed by new research by a team of scientists led by Vincent Corbel from the Institut de Recherche pour le Développement in Montpellier, France and Bruno Lapied from the University of Angers. According to Science Daily, "Researchers say that more investigations are urgently needed to confirm or dismiss any potential neurotoxicity to humans, especially when deet-based repellents are used in combination with other neurotoxic insecticides." [August 2009. Military Implications, Sources²⁸³]

New Evidence on Silver Toxicity

Researchers of the Dept. of Pharmacology and Cancer Biology at Duke University Medical Center conducted a study whose results, "...provide evidence that silver has the potential to kill developing nerve cells and is even more potent than currently known neurotoxicants."... Effects varied widely with test conditions, making interpretation difficult. [Related items: *UK Defra Committee Report on Nanosilver and Industry Silver Nanotech Group Opposes "New Material" Designation* in December 2009, and *Petition Filed for EPA to Regulate Nanosilver* in November 2009 environmental security reports.] [January 2010. Military Implications, Sources²⁸⁴]

Chemicals Regulatory Regime might be adjusted to Include Nanomaterials

The EU's Chemical Regulatory Regime might be adjusted to Include Nanomaterials

The Institute for Health and Consumer Protection of the European Commission's Joint Research Centre (JRC) awarded two contracts to a consortium led by SAFENANO (Institute of Occupational Medicine) for the development of specific advice on the assessment of nanomaterials under REACH (the EU's Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals). The two projects, REACH-NanoInfo (aka RIP-oN2), and REACH-NanoHazEx (RIP-oN3), address the REACH information requirements on intrinsic properties of nanomaterials, and the processes for undertaking exposure assessments and conducting hazard and risk characterization for nanomaterials within the REACH context. The work will be carried out in consultation with a range of stakeholders and will be used by the EC to support further developments in REACH Guidance on Information Requirements and Chemical Safety Assessment. Along the same lines, *Nanomaterials under REACH* report by the Netherlands' National Institute for Public Health and the Environment (RIVM) indicates that

REACH doesn't adequately cover nanomaterials and points out the differences in risk assessment requirements between nano- and macro-sized materials. [Related item: *EU to Add Carbon and Graphite to REACH Program* in the June 2008 environmental security report.] [January 2010. Military Implications, Sources²⁸⁵]

Comments Solicited on Proposed UN Nanotech Safety Report

According to Meridian Nanotechnology and Development News, "The United Nations' (UN) Strategic Approach to International Chemicals Management (SAICM), a policy framework to promote chemical safety around the world, has developed an outline for a report focusing on nanotechnologies and manufactured nanomaterials including, in particular, issues of relevance to developing countries and countries with economies in transition... Comments are invited and may be submitted until May 1, 2010. The final report will be submitted at the first meeting of the Open ended Working Group, in 2011, and at the third session of the International Conference on Chemicals Management." [March 2010. Military Implications, Sources²⁸⁶]

Asian Countries to Adapt their Chemicals Regulatory Systems to EU REACH System

China, Japan, and Korea have set the broad framework for adapting their chemicals regulatory systems to the EU REACH (Registration, Evaluation, Authorization and Restriction of Chemical substances) system. So far, they have only introduced REACH in the top legal structure, but during 2009–2010, their governments will issue additional regulations on issues such as chemical exposure, risk assessment, classification of chemicals, and collection of hazard data. Venues used for policy coordination include: the Tripartite Environmental Ministers Meeting; the Chemical Dialogue; the UN Strategic Approach to International Chemical Management, and the Globally Harmonized System on Classification and Labeling of Chemicals. The "REACHing Asia Continued" report examines the differences between the Asian chemicals regulatory system (specifically China, Japan and Korea) and the EU REACH system and outlines national frameworks covering, inter alia: pollutant release and transfer register; import and export restrictions; occupational exposure limits and protection; and chemical restrictions in products/compositions. [October 2009. Military implications, Source²⁸⁷]

U.S. to Revise the Toxic Substances Control Act

The overhaul of the U.S. 1976 Toxic Substances Control Act (TSCA) will require prioritizing tens of thousands of chemicals currently on the market. While there is agreement that the focus should be on the highest-priority chemicals based on potential health risks, the industry prefers using existing data, while environmentalists call for a risk-based standard focused on chemical regulation rather than product regulation. [October 2009. Military implications, Sources²⁸⁸]

Toxic Substances Control Act Up for Revision

The Safe Chemicals Act of 2010 has been introduced in Congress to replace the Toxic Substances Control Act of 1976. The new law would include size, size distribution, shape, and surface structure in the definition of a chemical's "substance characteristic", raising the question of the effect new provisions would have on products containing nanomaterials. [June 2010. Military Implications, Source²⁸⁹]

U.S. New Measures on Chemicals Safety

The U.S. Environmental Protection Agency has created a ‘Chemicals of Concern’ list and adopted additional measures for reducing risks posed by compounds raising serious potential health or environmental concerns: phthalates and polybrominated diphenyl ethers (PBDEs) were added to the list; risk-reduction actions should begin for several phthalates, short-chain chlorinated paraffins, and perfluorinated chemicals; and the three-year DecaBDE phaseout will be reinforced. [Related item: *New Chemicals Considered for Toxic Lists* in January 2009 environmental security report.]

The U.S. Congress is proposing to update the 34-year-old federal Toxic Substances Control Act (TSCA), requiring more through testing for chemicals. In the preamble to the debate, the Safer Chemicals, Healthy Families coalition released a report which notes that since 1976, when the federal TSCA became law, the EPA has required testing on only 200 of the 83,000 chemicals in common use and issued regulations for only five, while 60,000 chemicals received approval without preliminary government testing. Highlighting the health and cost issues associated with toxic chemicals, it estimates that the new regulations would reduce the incidence of chronic diseases by 0.1% and direct health care costs by \$5 billion a year in the U.S. [Related item: *U.S. to Revise the Toxic Substances Control Act* in October 2009 environmental security report.] [January 2010. Military Implications, Sources²⁹⁰]

California Proposes Reducing the Level of Chromium 6 in Water

The California Office of Environmental Health Hazard Assessment has proposed a “public health goal” of 0.06 ppb of hexavalent chromium (Cr 6) for the state’s drinking water. The current state and national standards for total Cr compounds are 50 ppb and 100 ppb, respectively. (EPA is reevaluating the latter.) The new California value was set as a result of a recent federal study setting a threshold of one cancer among every one million people exposed for a lifetime. After public comments, the California Department of Public Health will adopt a regulation setting a maximum allowable level for water supplies based on the health goal but also considering economic and technological factors. [Related item: *New Substances Identified as Harmful to Human Health and the Environment* in June 2009 environmental security report.] [January 2010. Military Implications, Sources²⁹¹]

Toxic Compound Detected in Chlorinated Tap Water

Xing-Fang Li and a team of scientists at the University of Alberta have discovered minute amounts (a few ng/l) of one of the toxic dichloroquinone compounds in chlorinated tap water. It is suspected that these compounds may pose a risk of bladder cancer. [December 2009. Military Implications, Sources²⁹²]

Environmental Effects from Flame Retardant Manufacturing Impurities

A research team from Canada’s National Laboratory for Environmental Testing has found that environmental pollution associated with the flame retardant Dechlorane Plus comes not only from that compound but from impurities introduced during its manufacture. [December 2009. Military Implications, Source²⁹³]

Ultrathin Solar Panels Could End Up On the EU list of Hazardous Materials, Due to Cadmium Content

The ultrathin photovoltaic panels, favored over the conventional crystalline models because they are more versatile, contain cadmium telluride for converting light to electricity. Since cadmium is banned from most products in Europe, rather than amending the law, the EU is expected to propose a way of pressuring solar companies to come up with alternatives to cadmium telluride, e.g., by requiring them to apply for four-year, renewable grace periods. A French government report concluded that risks to human health from cadmium exposure during normal operation of the panels were negligible. One of the largest U.S. panel manufacturers has set up a voluntary system that would be funded in advance to recycle and reuse 95% of the cadmium and tellurium in its modules sold worldwide. [November 2009. Military implications, Source²⁹⁴]

Increasing Advocacy for BPA Restrictions

France has adopted legislation banning baby bottles containing bisphenol A (BPA), although the opposition parties demanded a larger spectrum ban. Some other European countries, as well as Canada, have regulations restricting or requiring precautionary use of BPA. In view of an upcoming assessment by the European Food Safety Authority (Efsa), to be published in July, a group of experts (40 organizations and 19 academics) endorsed a letter supporting Efsa's decision to review a larger number of studies addressing potential hazards of BPA use in consumer products, including non-industry-funded papers. Over 130 studies conducted in the past ten years revealed that even low levels of BPA could cause serious health problems. [Related item: *Concerns Increasing for BPA Bans and Phthalates* in October 2008 environmental; security report.] [June 2010. Military Implications, Source²⁹⁵]

Building Contaminants Linked to Parking Lots with Coal Tar Sealant

Scientists at the U.S. Geological Survey have published a paper linking high concentrations of the contaminants polycyclic aromatic hydrocarbons (PAHs) in house dust to coal tar sealants used on parking lots. PAHs are an environmental hazard because several are probable human carcinogens. [Related item: *Study Shows Nanotube Manufacture May Pollute Environment* in August 2007 environmental security report.] [January 2010. Military Implications, Sources²⁹⁶]

Organophosphate Flame Retardants May Pose Health Risk

New findings indicate that house pollution from organophosphate flame retardants (widely used as replacements for the now banned polybrominated diphenylethers (PBDEs)) may present a health risk, inducing altered hormone levels and declined semen quality in men. [February 2010. Military Implications, Source²⁹⁷]

Greenhouse Gas Emissions

Post-Copenhagen Negotiations

The Bonn Climate Change Talks took place between May 31 and June 11, 2010 in Bonn, Germany, attended by approximately 2,900 participants, representing governments, intergovernmental and non-governmental organizations, academia, the private sector and the

media. Critics say that not much was achieved for advancing the negotiations for the next phase. The request of the Alliance of Small Island States (AOSIS) and many other parties for a technical paper by the Secretariat on options for limiting global average temperature increase to 1.5°C and 2°C from pre-industrial levels, was opposed by Saudi Arabia, Oman, Kuwait and Qatar. The final text of the meeting mentions that industrialized countries should aim to cut greenhouse gases 25-40% by 2020 but it does not set a year when that comparison should start (scientists say the base line should be 1990, while the United States has argued for 2005.)

Meantime, the IEA reports that fossil fuel consumption subsidies amounted to \$557 billion in 2008, a considerable increase from \$342 billion in 2007. Considering a baseline in which subsidy rates remain unchanged, IEA forecasts and models indicate that phaseout between 2011 and 2020 would need to: cut primary global energy demand by 5.8% by 2020; cut global oil demand by 6.5 mb/d in 2020, predominately in the transport sector; reduce CO₂ emissions by 6.9% by 2020 – or 2.4 GT of CO₂. It notes that both the Copenhagen Accord and the G20 subsidies are important to meet warming targets. If the Copenhagen Accord pledges were fully implemented, then emissions would be reduced by 70% of what is needed to be on track to meet the 2°C target by 2020. Additionally, if the G20 subsidy commitment were to be fully implemented, it would reduce emissions by more than 30% of what is needed to be on track to meet the 2°C target by 2020. [June 2010. [Military Implications, Sources](#)³⁰⁰]

The second round of negotiations under the UN Framework Convention on Climate Change began in Bonn, Germany, on May 31 and is scheduled to conclude on June 11. The meeting brings together representatives from 182 countries. A report by the U.S. Energy Information Administration estimates that world energy consumption would rise 49% by 2035, to 739 quadrillion BTU in 2035 from 495 quadrillion BTU in 2007, led by developing nations such as China and India, whose part of total world energy consumption will grow from about 20% to 30% over the projection period, while the U.S. share would fall from 21% to about 16% over the same period. [May 2010. [Military Implications, Sources](#)³⁰¹]

The first round of UN climate change negotiations since the Copenhagen conference was held in Bonn, April 9-11, 2010, with the main objective to agree on the organization and methods of work for 2010. More than 1,700 delegates attended from 175 countries. In order to advance the negotiations towards a treaty in Mexico, it was decided that, in addition to the negotiating sessions already scheduled for 2010, two additional meetings would be held of at least one week each, to take place between the 32nd session of the United Nations Framework Convention on Climate Change (UNFCCC or FCCC) Convention subsidiary bodies—May 31-June 11, 2010, and the UN Climate Change Conference in Mexico— November 29-December 10, 2010.

In an effort to get developing countries on board for an international global warming deal, the U.S. State Department announced that countries opposing the Copenhagen accord will be denied climate change assistance from the promised \$30 billion climate aid fund. [April 2010. [Military Implications, Sources](#)³⁰²]

On March 9, 2010, China and India formally announced at the UN Framework Convention on Climate Change that they agree to be listed as parties to the Copenhagen accord. India specifically stipulates that the accord is not legally binding, but serves as a negotiating framework for a post-Kyoto treaty. There is increased agreement that it is unlikely that a treaty

will be signed at the Mexico meeting in 2010, but rather hopes for it to happen at the December 2011 meeting to be held in South Africa. [March 2010. [Military Implications, Sources](#)³⁰³]

The United Nations Framework Convention on Climate Change (UNFCCC) publishes the Copenhagen Accord climate pledges. A total of 55 countries have submitted by February 1st their plans to curb greenhouse gas emissions by 2020, as set at the Copenhagen climate conference in December 2009. Together, these countries account for 78% of the global emissions from energy use. China and India pledged to reduce the growth rate of their emissions by up to 45% and 25%, respectively, compared to 2005 levels. The U.S. pledged to cut its absolute carbon emissions by about 17% below 2005 levels. The EU maintains its pledged 20% cut below 1990 levels and 30% if other nations deepen their reductions. Nevertheless, the Climate Interactive team says that if current proposals would be fully implemented, the average global temperature would still rise by approximately 3.9°C (7.0°F) by 2100, exceeding the 2°C goal.

To advance negotiations for a binding treaty, an extra session of UN climate talks will be held April 9-11, at the Bonn-based UN Climate Change Secretariat, prior to the session scheduled in Bonn for May 31-June 11. Similarly, the UNEP information note “How Close Are We to the Two Degree Limit?” says that the chances of keeping global temperature rise below 2°C are 50/50. The report says that the annual global greenhouse gas emissions should not exceed 40 to 48.3 metric Gigatons (Gt) of equivalent CO₂ in 2020 and should peak sometime between 2015 and 2021, while based on the pledges, the expected emissions for 2020 range between 48.8 and 51.2 GT. Global emissions should then further fall 48%-72% by 2050. [February 2010. [Military Implications, Sources](#)³⁰⁴]

States that signed the Copenhagen accord agreed to announce (by end-January 2010) their official CO₂ emissions reduction commitments. The EU decided to maintain its commitment of 20% greenhouse gas emissions reduction by 2020 compared to 1990 levels, and 30% if other powers make comparable pledges. Australia announced that it will cut greenhouse gas emissions by 5% of 2000 levels by 2020 unconditionally, and 15% to 25%, depending on other countries’ commitments.

The environment ministers of the BASIC countries (Brazil, South Africa, India, and China) met on January 24 to discuss cooperation in future climate negotiations and decided to adhere to the agreements made in the Copenhagen Accord regarding the submission of their emission reduction actions. Cooperation among these countries may shape future climate change negotiations and influence the adoption of a binding climate agreement. The next round of climate talks is scheduled for November 29, 2010, with pre-conference negotiations slated to take place May 31 to June 11, 2010. [January 2010. [Military Implications, Sources](#)³⁰⁵]

“Copenhagen Accord” Brokered by President Obama at UN Climate Change Conference Is a Step Forward in Negotiations—Next Stop Mexico

The UN Conference on Climate Change in Copenhagen was attended by over 100 heads of state and government, representatives of 193 nations, and between 40,000 and 100,000 people from around the world came to participate in side events. The December 7–18, 2009 set of conferences and meetings resulted in a non-binding 12-paragraph Copenhagen Accord that calls for international cooperation to limit atmospheric CO₂ to 450 parts per million to make sure global warming does not rise more than 2°C, that developed and developing nations set carbon reduction targets that are internationally verifiable, that developed countries provide funds

approaching USD 30 billion for the period 2010 to 2012 for developing countries with balanced allocation between adaptation and mitigation, and that developed countries mobilize USD 100 billion a year by 2020 to address the needs of developing countries. However, the original objective was not achieved: to adopt a treaty that would extend or replace the 1997 Kyoto Protocol in order to reduce greenhouse gas emissions and address global climate change.

The Conference and the numerous side-events generated an extraordinary wealth of information regarding challenges and potential strategies for addressing global climate change and set the stage for further negotiations. The next round of climate talks is scheduled for November 2010 in Mexico.

Note: Some scientists warn that lack of clear targets and commitments might raise CO₂ concentrations to around 700 parts per million (compared to 450 ppm that scientists consider the limit for keeping global warming below 2°C), meaning a potential warming by 3.5°C by 2100. The International Energy Agency estimates that about \$10.5 trillion in additional investment is needed by 2030 for setting the world on the path to low-carbon development. [December 2009. *Military Implications, Sources*³⁰⁶]

Post-Kyoto Protocol Negotiations

The final round of negotiations before the Climate Summit to be held in Copenhagen took place November 2-6, 2009, in Barcelona, Spain. Despite some progress, concluding a legally binding instrument in Copenhagen remains uncertain. While some suggest that a new mandate might be needed to continue negotiations and possibly reach a global climate pact in 2010, new hopes emerged when Britain suggested the creation of a Copenhagen launch fund for helping poorer states deal with climate change-related challenges. The fund, to begin in 2010, would reach \$10 billion per year by 2012. Britain already pledged £800 million (\$1.3 billion). The Committee of African Heads of State and Government on Climate Change (Committee of Ten) mandated to speak on behalf of Africa expressed that Africa expects the agreement to stipulate clear measures for providing Africa technology and capacity-building to “resolve the present climatic crises and spare the continent from catastrophes.” The vulnerable island states also ask for funds and concessions to deal with rising sea level consequences. At the same time, new targets were announced by the world’s largest GHG emitters: U.S. intends to reduce its GHG emissions “in the range of” 17% below 2005 levels by 2020 and 83% by 2050, while China plans to reduce its CO₂ intensity — emissions per unit of GDP — by 40–45% by 2020, compared to 2005 levels. The EU already announced its 20/20/20 policy cutting emissions by 20% (30% if other industrialized states follow suit) by 2020 compared to 1990 levels. Brazil, the fourth-biggest GHG contributor, offered a reduction of 36-39% based on its projected economic output in 2020. India is also expected to make some announcement soon. [November 2009. [Military Implications, Sources](#)³⁰⁸]

The deadlock in negotiations for a UN climate treaty continues. The Bangkok talks (held September 28 to October 9, 2009) ended with deep divisions between developing and developed countries and the length of the text still to be processed remains considerable. “Satisfactory” progress is reported as being achieved on issues such as adaptation, technology, and capacity building. The negotiations will resume in Barcelona, November 2-7, which should produce a

report to the 15th Conference of the Parties (COP 15) to be held in Copenhagen, Denmark, December 7-18, 2009. Many speculate that a legally binding document is unlikely to be agreed upon in December, and a new deadline might be set in 2010.

Meantime, regional and national efforts continue. Europe offers to cut its greenhouse gas emissions by up to 95% by 2050 and by 30% by 2020 if a deal is reached at Copenhagen. The U.S. Senate Environment and Public Works Committee is advancing on climate-change legislation, to be submitted at the beginning of November, that aims to reduce 2005-level greenhouse gases emissions of U.S. industry by 20% by 2020. [October 2009. [Military Implications, Sources](#)³⁰⁹]

Some 100 heads of State and Government attended the UN climate change summit one day before the opening of the UN General Assembly's 64th session (September 23rd). Japan's prime minister-elect pledged to cut greenhouse gas emissions by 25% in the next 10 years from 1990 levels. The Climate Change Summit of the Alliance of Small Island States, held on September 21st, adopted the AOSIS Climate Change Declaration, which calls on "urgent progress towards a fair and meaningful Copenhagen outcome." Along the same lines, the G-20 summit agreed on actions such as phaseout over the medium term of inefficient fossil fuel subsidies, which would reduce greenhouse gas emissions by 10% by 2050. In view of almost stalled negotiations for a climate change treaty, French President Nicolas Sarkozy proposed that the leaders of the major industrialized nations hold an extraordinary summit ahead of the December climate conference. The next post-Kyoto treaty negotiations are taking place in Bangkok, Thailand, September 28–October 9, 2009. [September 2009. [Military Implications, Sources](#)³¹⁰]

An intersessional consultation, as part of ongoing negotiations for a post-Kyoto Protocol, was held in Bonn, August 10-14, 2009, attended by approximately 2,400 participants. One of the focal points was to revise and consolidate the nearly 200-page long text and prepare for negotiations at coming meetings. Vulnerable states call for a 1.5°C (2.7°F) temperature rise ceiling by the end of the century, meaning that rich nations should cut greenhouse gases by at least 45% below 1990 levels by 2020. However, average cuts promised so far by the rich total just 10% to 16%. The next negotiations will be held in Bangkok, Thailand from September 28 to October 9, and Barcelona, November 2–6. Other related meetings (before Bangkok) are the UN High-Level Event on Climate Change, and the G-20 meeting in Pittsburgh, Pennsylvania.

China announced that its CO₂ emissions will start falling by 2050, said Su Wei, director-general of the climate change department at the country's National Development and Reform Commission. This sets the first officially announced timeframe. The current five-year plan to 2010 stipulates a target of reducing energy intensity by 20%, and the next five-year plan is expected to include tougher targets. Nevertheless, it is not clear if China will agree to some emissions cap ahead of the Copenhagen climate meeting. [August 2009. [Military Implications, Sources](#)³¹¹]

At the G8 Summit held in L'Aquila, Italy, the U.S. joined Europe in seeking to keep average temperatures from rising more than 2°C (3.8°F) above their pre-industrial levels. Rajendra Pachauri, Chair of the IPCC, noted that the agreement doesn't consider the IPCC's recommendation that in order to achieve the 2°C goal, emissions should peak by 2015. Nevertheless, the accord is a positive sign toward a post-Kyoto treaty to be negotiated in December.

In the meantime, the G2 — U.S. and China — signed an agreement that engages the two countries in more cooperation on climate change, energy, and the environment. Although not setting firm goals or targets, it reiterated support for a ten-year cooperation and sets the stage for a new climate change policy dialogue. [July 2009; [Military Implications, Sources](#)³¹²]

Reducing GHG Emissions Using the Montreal Protocol and other Regulatory Systems

Considering the need for “fast-action” to reduce greenhouse gas emissions and avoid abrupt climate changes, international ozone negotiators suggest the use of the Montreal Protocol and similar existent international regulations, by amending them to cover greenhouse gases, such as hydrofluorocarbons (HFCs), and black carbon particles and precursor gases. The subject is on the agenda of the 21st meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, to be held in Egypt, on November 4-8, 2009. Note: “fast-action” includes regulatory measures that can begin within 2–3 years, be substantially implemented in 5–10 years, and produce a climate response within decades. [October 2009. Military Implications, Sources³¹³]

New Decisions Adopted for Strengthening the Montreal Protocol

The 21st meeting of Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (MOP21), held in Port Ghalib, Egypt, November 4-8, 2009, adopted 30 decisions, including examining alternatives to hydrochlorofluorocarbons (HCFCs), environmentally sound management of banks of the ozone depleting substance methyl bromide; and data and compliance issues. A North American proposal on phasing down hydrofluorocarbons (HFCs) was withdrawn after China, India, and several Arab countries disagreed with discussing HFCs under the Montreal Protocol. [November 2009. Military Implications, Sources³¹⁴]

Powerful Greenhouse Gas HFCs Might be banned under the Montreal Protocol

Although hydrofluorocarbons (HFCs) are not ozone-depleting chemicals, their use and commercialization might be banned under the Montreal Protocol. Experts and policy makers increasingly call for HFCs’ phaseout due to their global warming potential hundreds or even thousands of times greater than CO₂. Countries, like the Federated States of Micronesia, threatened by global warming, are advocating for a 90% HFC phaseout by 2030. The issue is expected to be discussed at the next meeting of the States Party to the Montreal Protocol, to be held November 4-8 in Port Ghalib, Egypt. [August 2009, Military Implications, Source³¹⁵]

North American Proposal to Phase Down HFC's

The EPA has announced that Canada and Mexico have joined the US in proposing to expand the scope of the Montreal Protocol on Substances that Deplete the Ozone Layer. The proposal would phase down hydrofluorocarbons (HFCs), which are a significant and rapidly growing contributor to climate change, and lists four possible substitute refrigerants. Note: previous proposals were opposed by China, India, and several Arab countries; see relevant item: New Decisions Adopted for Strengthening the Montreal Protocol in November 2009 environmental security report. [May 2010. Military Implications, Source³¹⁶]

Draft International Standards for Measuring Greenhouse Gas Emissions for Cities

The Draft International Standard for Determining Greenhouse Gas Emissions for Cities is setting a common framework for calculating the emission amounts of greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). The computation is done on a per capita basis, allowing comparison and analysis among cities. Measurements are now completed for more than 40 cities, with the aim of completing it for all world cities. The Draft was launched by UNEP, UN-HABITAT, and the World Bank. It is now open for public comment. [April 2010. Military Implications, Sources³¹⁷]

EU Potential New Measures For Reducing CO₂ Emissions

Following discussions of EU finance ministers concerning a carbon tax across the bloc to further reduce CO₂ emissions and fight climate change, the European Commission will probably make the formal proposal next year. Several EU member states already have such a tax, but a bloc-wide deal might be difficult, since taxation is a matter of national sovereignty and any change requires unanimity among the 27 member states.

To further reduce emissions from transportation vehicles, the European Commission proposed emissions limits for light trucks and vans (minibuses to be exempted). The proposal restricts light trucks and vans CO₂ emissions to 175 grams/kilometer driven (present EU average is around 200 grams.) This limit will be introduced gradually from 2014 to 2016, while by 2020 van makers would have to meet a 135 grams target or face fines. The draft legislation moves now to negotiations at the European Parliament and EU governments. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.] [October 2009. Military Implications, Sources³¹⁸]

France Proposes Carbon Tax Across EU and on Imports

President Nicolas Sarkozy announced that France would propose a carbon tax across the EU, and carbon tariffs on products imported from countries with weaker environmental regulations. Nationally, a bill expected to be presented soon to the Parliament is proposing a progressive carbon tax similar to the income tax, taxing big polluters on their CO₂ emissions. The French government hopes the regulation will come into force on July 1, 2010, and be effective until the EU emissions permits scheme enters into force. [Related item: *EU Potential New Measures For Reducing CO₂ Emissions* in October 2009 environmental security report.] [January 2010. Military Implications, Sources³¹⁹]

China and U.S. Announce Climate Change Goals

China announced it will reduce carbon emissions per unit of GDP by 40 to 45% of 2005 levels, by 2020. The U.S. announced its goal of reducing its emissions by 17% (regardless of emissions per unit of GDP) during this period, matching legislation passed by the U.S. House of Representatives. Both President Obama and Premier Wen will attend the Climate Change conference in Copenhagen in December along with more than 85 heads of state and government (confirmed as of November 30, 2009.) Premier Wen Jiabao has also hosted a group from developing countries including India and Brazil to create a technology transfer position from

richer countries in exchange for developing countries' mitigation efforts. [November 2009. Military Implications, Sources³²⁰]

British Group Outlines Plan for Zero Emissions by 2030

The Centre of Alternative Technology (CAT) in Wales has outlined a series of measures that could be taken to bring UK emissions down to zero by 2030. They involve a combination of electrification, insulation, and a massive scaling up of offshore wind. [June 2010. Military Implication, Sources³²¹]

New Technologies

[New Regulations Needed for Emerging New Technologies](#)

[Geo-engineering Promises/Threatens](#)

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New Regulations Needed for Emerging Technologies

Report Suggests New Approach to Technology Assessment

Reinventing Technology Assessment: A 21st Century Model, a report by the Woodrow Wilson International Center for Scholars, looks at closing the gap between the rhetoric of “engaging the public” in S&T debate and practice. It provides a comprehensive overview of participatory technology assessment (pTA) and applications in the EU and U.S., and recommends creation of “an institutional network that can integrate public engagement into future technology assessment activities.” [April 2010. Military Implications, Source³²³]

Geo-engineering Promises/Threatens

Geoengineering May Require International Environmental Regulations

Several national authorities are assessing the potential need for national or international regulations for safe development and use of geoengineering to address climate change and global warming. A committee in Britain's House of Commons began its assessment and is cooperating with the U.S. House Science and Technology Committee, which is also planning to begin hearings this year on scientific, engineering, ethical, economic, and governance aspects related to geoengineering. This March a group of scientists will meet in California to set guidelines for large-scale field tests of proposed geoengineering techniques—ranging from genetically modified trees to absorb CO₂, to spewing sunlight-deflecting sulfate particles into the upper atmosphere. Some scientists argue that new environmental regulations should be established even before field tests begin, due to potentially large geographic effects of some geoengineering techniques. Others, while comparing geoengineering to nuclear weapons, which have been

successfully managed through international agreements, point out the possibility of serious long-term risks, and propose an international annual research budget growing from \$10 million to \$1 billion by the end of 2020. [January 2010. Military Implications, Sources³²⁴]

International Framework Needed to Address Governance Gap over Geoengineering

A new report by the ETC group addresses the potential implications of geoengineering pointing out the urgent need for an international framework developed under the auspices of the UN to evaluate new technologies. [August 2009. Military Implications, Source³²⁵]

UK and US Legislators Review Geoengineering Proposals

The US House of Representatives Committee on Science and Technology held a hearing to examine the scientific, engineering, ethical, economic, and governance aspects of geoengineering and intends to hold two or three more. The UK House of Commons Science and Technology Committee has plans for studying whether geoengineering would require new national or international regulations. The two groups plan a partnership, holding parallel hearings and sharing materials when they are publicly available. [November 2009, Military Implications, Sources³²⁶]

Royal Society Issues Major Geo-engineering Report

“Geoengineering the climate: science, governance and uncertainty” by the UK Royal Society is a comprehensive review of the main geo-engineering options. The 98-page document discusses carbon dioxide removal techniques, solar radiation management techniques, and governance. It also contains a large reference list and a complete glossary. [September 2009, Military Implications:, Sources³²⁷]

Nanotechnology

Assessment of Potential Health and Environmental Implications of Nanotechnology

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- [Call for Systematic Studies to Link Nanoproperties and Hazards](#)
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New Studies Add to Knowledge on Nanoparticles and Biological Reactions
Regional Reports on Nanotech Issued by International Group
Improved Investigative Techniques for Identifying Engineered Nanomaterials in the Environment
Insects Are Affected by, and Can Spread, Carbon Nanoparticles
Industry Silver Nanotech Group Opposes "New Material" Designation
EPA Unveils Nanotech Risk Research Plan
EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case
Petition Filed for EPA to Regulate Nanosilver
Policy Framework for Addressing Nanomaterial Risks in California
Health Canada Seeks Comments on Nanomaterials Definition
European Commission to Review Nanomaterial Policies
European Environmental Bureau Assessment of Nanotech Governance Issues
EC's DEEPEN Final Report on Nanotech Development Ethics
European FramingNano Governance Platform
European Consumer Organizations Call for Better Nano Regulation
EC Publishes Paper on Options for Framing Public Policy on Nanotech
Five-Year European Study of the Needs and Opportunities for Nanotech R/D
Nanomaterials Labeling in New EU Uniform Cosmetics Rule
French Group Opens Public Web Site on Nanotechnology
German Body Advises against Nanosilver in Consumer Products
Russia Sets Up Nanotech Risk Assessment and Regulation Cooperation
Russia and Finland to Cooperate on Nanotech Regulation Development
Australia Sets Up Framework for Safe Nanotech
Australian Government Proposes New Nanotech Regulations
India to Establish Nanotechnology Regulatory Board
Nanomaterials Guidelines Adopted by 53 African Countries
Databases on Nanosafety
New Map of Nanotech Centers
New Wiki on Safe Nanotech in the Workplace
ILO Booklet on Workplace Hazards
Comprehensive Review of Engineered Nanomaterials Health and Safety
Nanotechnology--Assessment of Health Safety and Environmental Factors
Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology
EU Efforts Underway to Improve Nanotech EHS Information
Report Suggests Current Nanotech Protective Gear May Not Be Adequate
Study Shows Ill Effects of Multiwall Carbon Nanotubes
Researchers Call for Broad Approach to Nanotube Risk Assessment
European Project to Study Metal Oxide Nanoparticle Risks
Metallic Impurities Affect Carbon Nanotube Toxicity
Questions Raised on Reliability of In Vitro Nanomaterials Toxicity Testing
New Results on TiO₂ Nanoparticle Toxicity to Cells
New Technique for Non-toxic Nanosilver
Sodium Cholate Found to Be Safe Surfactant for Carbon Nanotubes
Device for Nanoparticle Study
EU Tightens Safety Precautions on Nano-containing Cosmetics

[Lack of Standards for Engineered Nanoparticles in European Surface Waters](#)
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[UK Solicits Participation in Nanotech Policy Formulation](#)
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[Australian Group Releases Two Workplace Nanosafety Reports](#)
[New Nanotech Survey Book Covers Environmental Aspects](#)
[What Is Nanotechnology and Why Does It Matter? Book on Nanotechnology and Ethics](#)
[Paper Examines "Nanotechnology: Safe By Design?"](#)
[Paper Reviews Nanotech Remediation of Waste Sites](#)

New Technology to Measure Single Nanoparticles

Prof. Lin Yang and his team at Washington Univ. have developed a “whispering-gallery-mode resonator” that provides a new degree of accuracy—1% to 2%—in the measurement of nanoparticle size. [December 2009. Military Implications, Sources³²⁹]

New Inventory Lists More Than 1000 Nanoproductions

The Wilson Center/Pew Trusts’ Project on Emerging Nanotechnologies (PEN) has noted that its inventory of consumer nanoproducts has now exceeded 1000 entries. [Related item: *New Map of Nanotech Centers* in the August 2009 environmental security report.] [September 2009. Military Implications, Sources³³⁰]

Global Archive of Government Nanotech Documents Launched

The Center for the Study of Law, Science, & Technology at Arizona State University's Sandra Day O'Connor College of Law has launched the Nanotech Regulatory Document Archive, a global database of government documents on nanotechnology. Each document will be accompanied by an abstract. The archive will be set up as an edited wiki, and, notes Nanowerk News, “Documents for a specific jurisdiction can be accessed by clicking on a map or on a region, nation or entity.” [December 2009. Military Implications, Sources³³¹]

List of Experts in Nanotechnology Ethics Published

The ObservatoryNano project has published Experts NanoEthics and Ethical, Legal and Social Aspects of Nanotechnology [sic], a comprehensive list of personnel in the field. According to the announcement, it "includes senior academics and consultants, experienced in nanoethics or ethical, legal and social aspects of nanotechnology from different countries in Europe and the rest of the world ... [,and in] addition, a list of junior experts including PhD students and young professionals". Each entry includes complete contact information and a note on area of expertise. [December 2009. Military Implications, Source³³²]

ObservatoryNANO 2nd Annual Report on Ethical and Societal Aspects of Nanotechnology Meridian Nanotechnology and Development News reports that the ObservatoryNANO project has published a report on nanobioethics that includes discussions of the ethical, legal and societal aspects of nanotech for health, medicine, nanobiotechnology, nanotech for agrifood, and on nanotechnology and animal testing. [May 2010. Military Implications, Sources³³³]

Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies

The EU and the US have undertaken a collaborative research project, Regulating Nanotechnologies in the EU and US: Towards Effectiveness and Convergence, to investigate the regulatory challenges raised by nanotechnologies and to assess the effectiveness of existing approaches. A conference, Transatlantic Regulatory Co-operation: Securing the Promise of Nanotechnologies, will be held September 10-11, 2009, in London, to discuss recommendations from the project, and to consider new ideas for the future. A subsequent, shorter meeting on the same subject will be held at the Wilson Center in Washington on September 23, 2009.

Securing the Promise of Nanotechnologies Towards Transatlantic Regulatory Cooperation report by the international collaborative project Regulating Nanotechnologies in the EU and U.S., is a comprehensive state-of-the-art overview of aspects related to nanotechnology: environment, health and safety risks; and key regulatory frameworks, issues and challenges—including relevant national and international institutions—in the U.S., EU, and internationally, with specific focus on chemical, food, and cosmetics regulations. The report highlights that although “No efforts have been undertaken as yet to create a formal, treaty-based, international framework for nanomaterials regulation,” in the future such an international framework treaty might be needed, given the globalization of nanotechnology developments. It concludes that the EU and the US should play a greater role in developing an international nanotech regulatory framework. Commenting on the report, some experts expressed that nanotechnology and biotechnology would need a complex and flexible regulatory system, due to their unknown evolution and often absence of data. [August 2009, September 2009. Military Implications, Sources³³⁴]

A study published in *Nature Nanotechnology* and reported by *Nanowerk News* found that public perceptions of nanotechnology do not follow previously seen patterns for new technological developments, and concludes that “Given the potential malleability of perceptions, novel methods for understanding future public responses to nanotechnologies will need to be developed.” [September 2009. Military Implications, Sources³³⁵]

Scientists Object to Generalized Nano-Hazard Statements

A group of distinguished scientists in the nanotechnology field have published an open letter in *Nanotoxicology* in order "to draw the attention of the nanotoxicology community to how the term 'nanoparticles' is being somewhat indiscriminately used, especially in the titles of scientific papers and in statements to the press." Their objection takes as an example "a recent paper that linked nanoparticles in the most general sense to seven very serious cases of occupational lung and pleural injury occurring in China. The exposures were not characterized, but histological assessment of lung biopsies and pleural fluid indicated the presence of nanoparticles with an unidentified origin or chemistry. Despite a lack of information on the nature of the nanoparticles, the research was published under the title 'Exposure to nanoparticles is related to pleural effusion, pulmonary fibrosis and granuloma' ". The panel strongly cautions all involved in communication of nanotech issues to consider the present uncertainties in the study of nanotech pathogenesis, to be precise in stating the technical bases and limitations of studies, and not to make such generalized statements as in the title cited above. [December 2009. *Military Implications*, Source³³⁶]

OECD Reports on Nanotech Risks

The OECD has published three reports on the safety of engineered nanomaterials:

Report of the Workshop on Risk Assessment of Manufactured Nanomaterials in a Regulatory Context

Report of the Questionnaire on Regulatory Regimes on Manufactured Nanomaterials

OECD Programme on the Safety of Manufactured Nanomaterials 2009-2012: Operational Plans of the Projects

http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html

- *Report of the Workshop on Risk Assessment of Manufactured Nanomaterials in a Regulatory Context* presents critical issues specific for risk assessment of nanomaterials in a regulatory context and identifies approaches for risk assessment based on the current state of knowledge. Presentations included Risk Assessment Case Studies on nano-TiO₂, nano-Ag and Carbon Nanotubes.
http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html [May 2010]
- *Report of the Questionnaire on Regulatory Regimes on Manufactured Nanomaterials* summarizes objectives and activities covered by each piece of legislation; features for consideration when amending or drafting legislation for regulatory oversight
http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html [May 2010]
- *OECD Programme on the Safety of Manufactured Nanomaterials 2009-2012: Operational Plans of the Projects* aims to ensure that the approach to hazard, exposure and risk assessment is of a high, science-based, and internationally harmonized standard
http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html [May 2010]
- Report of an OECD Workshop on Exposure Assessment and Exposure Mitigation: Manufactured Nanomaterials (90 pp.) Contents include presentations on Exposure Measurements--Latest Developments in Analytical Methodology; Distinction Between Carbonaceous Nanomaterials and Background Airborne Particulate Matter; Relevance of Dustiness and Aerosol Dynamics for Personal Exposure; Development of Exposure Situations for Manufactured Nanoparticles (MNPs); Control Banding Nanotool- A

Qualitative Risk Assessment Method; Approaches for the Definition of Threshold Limit Values for Nanomaterials <https://www.oecd.org/dataoecd/15/25/43290538.pdf>

- Comparison of Guidance on Selection of Skin Protective Equipment and Respirators for Use in the Workplace: Manufactured Nanomaterials (25 pp.) <https://www.oecd.org/dataoecd/15/56/43289781.pdf>
- Emmission (sic) Assessment for Identification of Sources and Release of Airborne Manufactured Nanomaterials in the Workplace: Compilation of Existing Guidance (25 pp.) <https://www.oecd.org/dataoecd/15/60/43289645.pdf> [August 2009, Military Implications³³⁷]

OECD has released several new publications in its series on the Safety of Manufactured Nanomaterials, including “Preliminary Review of OECD Test Guidelines for their Applicability to Manufactured Nanomaterials.” [September 2009. Military Implications³³⁸, Sources³³⁹]

OECD to Release Guidance for Manufactured Nanomaterials Testing

The Organization for Economic Cooperation and Development plans to publish in the next month or so new draft guidance on the preparation of samples used for safety testing of manufactured nanomaterials. According to the Bureau of National Affairs, an OECD official stated that using traditional bulk chemical test methods with nanomaterials can lead to unexpected results and, “Materials tend to agglomerate or will attach themselves to other things that are in the [test] medium. So there is always the possibility that people are not testing the thing that they thought they were testing,” He also announced that OECD will be explaining human health and environmental safety aspects of nanotechnology at a series of regional meetings. “We will be explaining the kind of work we've been doing and the kind of guidance documents that we've developed,” he said. The first such event will be Nov. 27 in Beijing, for the Asia-Pacific region. [November 2009. Military Implications, Source³⁴⁰]

OECD Publishes Nanomaterials Roadmap and Information Gathering Analyses

The Organisation for Economic Co-operation and Development has published Manufactured Nanomaterials: Roadmap for Activities During 2009 and 2010, which, according to Nanowerk News, “presents a brief description of the ways in which the Working Party on Manufactured Nanomaterials (WPMN) contributes to the overall objectives of the Environment, Health and Safety Programme (EHS), and the OECD as a whole.” It has also issued Analysis of Information Gathering Initiatives on Manufactured Nanomaterials, which specifies a desirable set of information elements, and considerations and recommendations for countries planning such an activity, and summarizes existing efforts in seven countries. December 2009. Military Implications, Sources³⁴¹]

National Nanotech Regulation Experts Discuss Emerging Issues

An interview with three key figures on emerging issues in nanotechnology regulation in the U.S. presents an overview of the nanotech-regulations situation in the U.S., notes that interest in evaluating the potential health and environmental risks of nanotechnology is growing, and reveals a high consensus that reasonable nanotech-regulations would be beneficial for the industry as well as for society. The article is the result of interview with Dr. Jeff Wong, Chief Scientist at the California Department of Toxic Substances Control (DTSC); Bill Gullledge, Managing Director of the American Chemistry Counsel (ACC)’s Chemical Products & Technology Division and Chair of the ACC Nanotechnology Panel; and Tom Jacob, former

DuPont Manager of Government Affairs for the Western Region and currently of T.R. Jacobs & Associates, LLP. [June 2010. Military Implications, Source³⁴²]

NanoAssociation for Natural Resources and Energy Security (NANRES) Formed

A group of nanotechnology-interested companies have formed the NanoAssociation for Natural Resources and Energy Security (NANRES), which, according to Nanowerk News, "is designed to advance the research, development, and commercialization of innovative energy and environmental-specific nanotechnologies." [December 2009. Military Implications, Sources³⁴³]

Rise of General Public Interest and Outcry

The rise of general public interest and outcry can signal a turning from involvement of technocrats and some politicians to a more general political atmosphere.

Disruptions by environmentalists have forced the cancellation of three of the scheduled debates in France on nanotech issues. [See item *French Public Debate on Nanotechnology* in the October 2009 environmental security report.]

Johannes Simons, of the Institute for Food and Resource Economics at the University of Bonn, and colleagues have published a paper, *The Slings and Arrows of Communication on Nanotechnology*, that addresses the general problems of communicating nanotechnology risk. According to Nanowerk Spotlight, they utilized research from Germany, the US, and Australia to develop their recommendation, "...risk communication on nanotechnologies requires target-specific approaches...", and that "...it is important to involve trusted institutions in the risk communication process. This could help people to accept the information because they do not suspect the communicator of having some hidden interests or of deceiving them with misleading information."

The need for reforms in the process is supported by a study by Prof. Elizabeth Corley, of Arizona State University's School of Public Affairs, and Dietram A. Scheufele of the University of Wisconsin—Madison that, "found widening gaps in nanotech knowledge since 2004 between the least educated and most educated citizens. Americans with at least a college degree have shown an increase in understanding of the new technology, while knowledge about nanotechnology has declined over time for those with education levels of less than a high school diploma", according to a Nanowerk News story.

The 5th International NanoRegulation Conference took place on November in Rapperswil, Switzerland, with the theme, " 'No Data, no Market?' - Challenges to Nano-Information and Nano-Communication along the Value Chain", presenting views and expectations regarding information and data exchange along the value chain, and possible approaches to the problem. A report is now available. According to Meridian Nanotechnology and Development News, "the debate at the conference revealed an urgent need for '...a coordinated information transfer of relevant nanospecific data along the value chain,' while recognizing the concerns that nano-labeling could be misunderstood as an indication of hazard by consumers." [January 2010. Military Implications, Sources³⁴⁴]

New Paper Claims Nanotech Environmental Downsides Trivialized or Ignored

The International POPs Elimination Network's Nanotechnology (IPEN) Working Group and the European Environmental Bureau (EEB) issued a paper claiming, "there is emerging evidence ... claims [of nanotech benefits] do not provide the whole picture, with serious environmental risks

and costs being trivialised or ignored". The 8-page paper covers a variety of topics, and contains a large number of references to the literature. The EEB also published a series of papers on Nanotechnologies in the 21st Century. IPEN is a global network of more than 700 public interest NGOs, and EEB represents over 145 environmental organizations in 31 countries. [August 2009. Military Implications, Sources³⁴⁵]

New Paper Suggests Concentrating Toxicity Studies on Smaller Nanoparticles

An on-line paper by researchers from the Center for the Environmental Implications of NanoTechnology (CEINT), Duke University, suggests that particles in the <30 nm section of the 1-100 nm "nano spectrum" should receive the most attention in studying the environmental and human health impacts of nanomaterials, since it is in that high surface-area-to-volume ratio range that possibly hazardous increases in reactivity are more likely to be observed. [September 2009. Military Implications, Sources³⁴⁶]

Call for Systematic Studies to Link Nanoproperties and Hazards

A recent paper by Dr. Amanda Barnard of CSIRO Australia discusses a "number of strategies ... combining the desirable aspects of theory, simulation, experiment and observation, and leading to predictions for incorporation into preventative frameworks" for mitigation of possible hazards from nanomaterials. [September 2009. Military Implications, Sources³⁴⁷]

Five-year Review of Royal Society Report

To mark the fifth anniversary of the publication of the Royal Society report on nanotechnology, the Responsible Nano Forum "invited opinion formers from science, risk, investment, NGOs, unions, business and consumer groups to reflect on the legacy of the report and what still remains to be done." The new report features contributions on: General Reflections; Regulation, responsibility, safety, and risk; Standardisation; Social, ethical, and public engagement; and International organisations. The Responsible Nano Forum also created a new website at www.nanoandme.org to provide a forum for discussion of nanotech issues. [August 2009. Military Implications, Sources³⁴⁸]

Report Reviews Nanoparticle Risks and Regulation

A new paper in the Royal Society's Interface reviews the current state of nanoparticle risk research and regulation. The authors discuss "Lessons from History", "Nanotoxicology & Exposure" (concluding that "in many cases knowledge is sufficient to implement effective controls to minimise exposure and these should be put into place"), and "Knowledge gaps & the road to regulation." The 12-page paper lists 52 references. [September 2009. Military Implications, Sources³⁴⁹]

New Studies Add to Knowledge on Nanoparticles and Biological Reactions

Work being done by Silvia H. De Paoli Lacerda and Jack F. Douglas at the Polymers Division of the National Institute of Standards and Technology (NIST) is shedding new light on the effects of nanoparticle size (5nm to 100nm) on their association with a whole range of important blood proteins. [January 2010. Military Implications, Sources³⁵⁰]

Regional Reports on Nanotech Issued by International Group

ICPCNanoNet is a repository of published nanoscience research for scientists in the EU and International Cooperation Partner Countries (ICPC). It has begun to publish its series of annual regional reports describing nanoscience and nanotechnology initiatives and activities in eight ICPC regions: Africa, Caribbean, Pacific, Asia, Eastern Europe and Central Asia (EECA), Latin America, Mediterranean Partner Countries (MPC), and Western Balkan Countries (WBC). Their extensive content includes regional initiatives, national programs for nanoscience and nanotechnology, responsible government agencies, centers for nanoscience and nanotechnology research, and national nanoscience and nanotechnology networks. It is an EU FP7 support action coordinated by the UK Institute of Nanotechnology that brings together partners from the EU, China, India and Russia. For access to reports, registration is required. [August 2009. Military Implications, Sources³⁵¹]

Improved Investigative Techniques for Identifying Engineered Nanomaterials in the Environment

A recently published note summarizes the present state of affairs in retrieving and analyzing nanoparticles from the environment. Some nanoparticles in the outside world have originated from masses of normally sized material of the same kind; others were coated originally or have acquired disguising coverings. This short article from Environmental Science and Technology of the American Chemical Society cites several current efforts to improve investigative techniques. [August 2009. Military Implications, Sources³⁵²]

Insects Are Affected by, and Can Spread, Carbon Nanoparticles

David Rand and Robert Hurt, and colleagues, at Brown University have published a study that, according to Nanowerk News, "raises the possibility that flies and other insects that encounter nanomaterial 'hot spots,' or spills, near manufacturing facilities in the future could pick up and transport nanoparticles on their bodies, transferring the particles to other flies or habitats in the environment". Further, "adult [fruit] flies died or were incapacitated when their bodies were exposed to large amounts of certain nanoparticles." Larvae were unaffected by ingested nanomaterial. The scientists also found that contaminated flies could transfer the nanoparticles to other flies, and hence possibly to humans. [August 2009. Military Implications, Sources³⁵³]

Industry Silver Nanotech Group Opposes "New Material" Designation

The Silver Nanotechnology Working Group (SNWG) has released the content of a presentation it made to EPA's Scientific Advisory Panel on the topic of "Evaluation of Hazard and Exposure Associated with Nanosilver and Other Nanometal Oxide Pesticide Products". In it, the group stated that EPA has safely and successfully regulated these products for decades, and that "calls for treatment of nanosilver as a new material requiring development of expensive new test regimes and discriminatory regulatory consideration are difficult to justify." [December 2009. Military Implications, Source³⁵⁴]

EPA Unveils Nanotech Risk Research Plan

The Environmental Protection Agency has announced a new research strategy for the next several years for work on the health and environmental risks from manufactured nanomaterials and on nanotech-based cleanup techniques. [October 2009. Military Implications, Sources³⁵⁵]

EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case

According to the Bureau of National Affairs' Daily Environment Report, cited in Meridian's Nanotechnology and Development News, EPA, "will continue to regulate carbon nanotubes on a case-by-case basis, as the distinct characteristics of each kind of carbon nanotube could mean each has different implications for human health and the environment." [July 2009. Military Implications, Source³⁵⁶]

Petition Filed for EPA to Regulate Nanosilver

The International Center for Technology Assessment (ICTA) and a coalition of consumer, health, and environmental groups has filed a petition with EPA, requesting that it regulate all nanosilver products as pesticides and ban all consumer products containing nanosilver, under the Federal Insecticide, Fungicide and Rodenticide Act. The action is being interpreted as a first step in a campaign for more intensive evaluation and possible regulation of nanoproducts. [November 2009. Military Implications, Sources³⁵⁷]

Policy Framework for Addressing Nanomaterial Risks in California

The Program on Reproductive Health and the Environment at the Univ. of California, San Francisco, has developed a draft set of policy recommendations to address the potential health risk for the state of California from nanomaterials and nanotechnology: "A Nanotechnology Policy Framework: Policy Recommendations for Addressing Potential Health Risks from Nanomaterials in California". The report presents "an overview of nanotechnology materials and their potential exposures and human health risks, and proposes a selection of policy options for addressing potential hazards and risks from nanotechnology." [May 2010. Military Implications, Sources³⁵⁸]

Health Canada Seeks Comments on Nanomaterials Definition

Health Canada has developed an interim policy statement that establishes a working definition for nanomaterials, in order to provide a basis for applying current legislation and regulations to nanotechnology products. They are seeking informal feedback from international stakeholders; comments will be accepted until 31 August 2010. [April 2010. Military Implications, Source³⁵⁹]

European Commission to Review Nanomaterial Policies

Responding to a request from the European Parliament, the European Commission plans to "review all relevant legislation within two years to ensure safety for all applications of nanomaterials in products with potential health, environmental or safety impacts over their life cycle," according to EU Environment Commissioner Stavros Dimas. [October 2009. Military Implications, Source³⁶⁰]

European Environmental Bureau Assessment of Nanotech Governance Issues

According to Nanowerk, the European Environmental Bureau has issued a report, *Nanotechnologies in the 21st Century - A Critical Review of Governance Issues in Europe and Elsewhere* (October 09), outlining the critical governance structures needed for the safe development and use of nanotechnology. The report "reviews the current uncertainties associated with the governance of nanotechnologies ... [and] presents NGO initiatives for nano regulation calling for the application of the precautionary principle and pre-market registration of materials." [October 2009. Military Implications, Sources³⁶¹]

EC's DEEPEN Final Report on Nanotech Development Ethics

The release of the Final Report from the EC-funded DEEPEN Project has been announced. The project characterizes itself as "Europe's leading research partnership for integrated understanding of the ethical challenges posed by emerging nanotechnologies in real world circumstances, and their implications for civil society, for governance, and for scientific practice." [October 2009. Military Implications, Sources³⁶²]

European FramingNano Governance Platform

The final version of the FramingNano Governance Platform [See *European FramingNano Governance Platform Draft Now Available* in the January 2010 issue of these reports] is now available. According to Nanowerk News, it, "describes a heuristic process of how current and future challenges in nanotechnology governance can be identified, assessed and decided on, and proposes a number of structural elements to achieve this", among them, "governance and regulation of nanotechnologies must be considered a dynamic affair which needs to be continuously adapted", and, "the relevant stakeholders and the interested public have to be meaningfully included in the definition of commonly accepted principles, criteria and values to be used for the assessment of these changes." [March 2010]

The draft FramingNano Governance Platform sets out a proposal for the framing of policy on nanotechnology in Europe; and, according to Nanowerk News, "highlights the major challenges to be overcome in order to successfully craft governance policies for nanotechnologies, and the communication issues that need to be addressed if Europe is to harness the full potential of this rapidly growing area of technology." The Governance Plan was discussed at the final International Conference of the FramingNano FP7 held in December 2009 and is being submitted to the European Commission "as a model of management to be followed by European policy makers and stakeholders." [January 2010. Military Implications, Sources³⁶³]

European Consumer Organizations Call for Better Nano Regulation

Two European consumer organizations – the European Consumers' Organisation (BEUC) and the European consumer voice in standardization (ANEC) – have issued a preliminary inventory of products on the EU market that contain nanomaterials. Its launch was accompanied by a series of demands from the organizations for better European regulation of nanotechnology. [November 2009. Military Implications, Source³⁶⁴]

EC Publishes Paper on Options for Framing Public Policy on Nanotech

The Governance and Ethics Unit of the EC's Directorate-General for Research has published an overview paper on options for framing public policy on nanotechnologies. According to the announcement, "The document gives an overview on four current or recently finished research projects in this field (Deepen, Nanocap, Nanoplat and FramingNano). The authors' aim is to give an insight into the nature of public debate on nanosciences and nanotechnologies, and the ways in which deliberative approaches could lead to better governance of these technologies." [February 2010. Military Implications, Sources³⁶⁵]

Five-Year European Study of the Needs and Opportunities for Nanotech R/D

A report on GENNESYS (Grand European Initiative on Nanoscience and Nanotechnology using Neutron- and Synchrotron Radiation Sources), a five-year European-wide study of the needs and opportunities for coordinating future R/D in nano science and technology, has been published. The 500-page report is the result of the collaborative work of more than 600 experts, and, according to Meridian Nanotechnology and Development News, "assesses the state of nanomaterials science and technology, highlights future challenges and research needs, and pinpoints the areas of research that will most benefit from joint research strategies with synchrotron radiation and neutron sources." [May 2010. Military Implications, Sources³⁶⁶]

Nanomaterials Labeling in New EU Uniform Cosmetics Rule

A story in Nanowerk News reports that the EU has harmonized 55 existing directives into a single regulation on the labeling of cosmetics in the Union. One provision, opposed by Germany, requires that product labels indicate the presence of nanomaterials. [November 2009. Military Implications, Sources³⁶⁷]

French Group Opens Public Web Site on Nanotechnology

The Citizen Alliance on the Challenges of Nanotechnologies (CACEN) (in French "Alliance Citoyenne sur les Enjeux des Nanotechnologies": ACEN) has opened a new (French language) website <nano.acen-cacen.org> where citizens can find and share information, questions, and analyses about societal issues raised by nanotechnologies. [June 2010. Military Implications, Source³⁶⁸]

German Body Advises against Nanosilver in Consumer Products

The Federal Institute for Risk Assessment (BfR), of the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV), is advising against the use of nanoscale silver ions in consumer products until a definitive safety assessment is available. [June 2010. Military Implications, Sources³⁶⁹]

Russia Sets Up Nanotech Risk Assessment and Regulation Cooperation

According to Nanowerk News, the CEO of RUSNANO, Anatoly Chubais, and the head of the Russian Federal Medical-Biological Agency, Vladimir Uiba, signed an agreement, "...to work jointly to ensure safe production and safe application of nanotechnology and nanomaterials." The charter of the collaboration is to "...ensure the sanitary and epidemiological well being of the

country's inhabitants during scientific research, development work, production, consumption, and disposal of products, materials, and finished goods created with nanomaterials and nanotechnology and during commercialization of nanotechnology". [February 2010. Military Implications, Source³⁷⁰]

Russia and Finland to Cooperate on Nanotech Regulation Development

RUSNANO Deputy CEO Andrey Malyshev and Reijo Munther, Director, Materials Technology, of Tekes, the Finnish Funding Agency for Technology and Innovation, have signed a memorandum on standardization and regulation in nanotechnology. The discussions examined problems in nanotech regulation and approaches to developing coordinated positions for presentation to standardization and safety agencies. [February 2010. Military Implications, Source³⁷¹]

Australia Sets Up Framework for Safe Nanotech

As part of the National Enabling Technologies Strategy, the framework provides funding to support nanotech/biotech policy and regulatory development, industry uptake, international engagement, and strategic research, as well as for public awareness and community engagement to increase understanding of enabling technologies [February 2010. Military Implications, Sources³⁷²]

Australian Government Proposes New Nanotech Regulations

The Australian government is inviting discussion of a proposal to strengthen regulation of industrial nanomaterials use in Australia. According to Nanowerk News, "Major regulatory reforms ... include: refinement of pre-market assessment categories for nanoforms of new chemicals, particularly where human health or environmental exposure can reasonably be anticipated; and a mandatory notification and assessment program for nanoforms of existing chemicals." It is expected that this carefully drafted proposal may serve as a model for other jurisdictions' regulatory efforts.

Probably also adding to the prominence of nanotech risk in the public eye in Australia is a new report, "What you should know about nano" for the Australia Institute by Fern Wickson of the University of Bergen, presented at the Asia-Pacific Science, Technology and Society Network Conference in Brisbane, and recommending stronger regulatory measures. [November 2009. Military Implications, Sources³⁷³]

India to Establish Nanotechnology Regulatory Board

The Indian Nano Mission Council has announced the establishment, probably in March, of a Nanotechnology Regulatory Board to regulate industrial nanotech products. [February 2010. Military Implications, Sources³⁷⁴]

Nanomaterials Guidelines Adopted by 53 African Countries

Representatives of 53 African governments attending the African regional meeting on Strategic Approach to International Chemicals Management adopted a non-binding resolution on handling manufactured nanomaterials. The resolution calls for: 1) a ban on shipment of wastes containing

nanomaterials to countries that lack capacity for adequately managing them; 2) the establishment and implementation of legal frameworks for the safe production, use, transport, and disposal of nanomaterials; 3) a health assessment of people exposed to nanomaterials; 4) the establishment of partnerships for capacity building related to nanotechnology. In the preamble to the International Conference on Chemical Management focusing on nanotechnologies and manufactured nanomaterials, to be held in 2012, the delegates suggested that the report should address all the aspects relative to nanotechnology and safe handling of nanomaterials throughout their life cycles and application of the 'no data, no market' principle prior to commercialization. [March 2010. Military Implications, Sources³⁷⁵]

Databases on Nanosafety

OECD Database on Nanomaterials Safety Research

The July 2009 issue of the bimonthly newsletter published by the European Network on the Health and Environmental Impact of Nanomaterials notes the establishment of the OECD Database on Research into the Safety of Manufactured Nanomaterials, which "holds details of completed, current and planned research projects on safety, which are to be updated (electronically) by delegations."

Automated Nanosafety Database Planned

According to a news release, a four-year R/D effort, the Nano Health Environment Commented Database (NHECD), is underway to "create and maintain an automated database that will retrieve, index and extract from scientific publications results related to the health and environmental impact of nanoparticles. The annotated, commented results and the extracted information will be stored at a central repository that will be available to research scientists, regulatory bodies and NGOs, [and] the general public." The EU FP7 project is coordinated by Prof. Oded Maimon and managed by Abel Browarnik, both of Tel Aviv University's Dept. of Industrial Engineering. [August 2009. Military Implications, Sources³⁷⁶]

New Map of Nanotech Centers

An article in Nanowerk News calls attention to a new map issued by the Pew Trusts/Wilson Center's Project on Emerging Nanotechnologies. The new work plots as varying-diameter and color-coded circles the locales and metro centers of nanotech enterprises of various types around the U.S. Available adjacent to the map are links to raw data and inventories of entities in various application areas. [August 2009. Military Implications, Sources³⁷⁷]

New Wiki on Safe Nanotech in the Workplace

According to Meridian, "The Rice University-based International Council on Nanotechnology (ICON), Texas, introduced the GoodNanoGuide, an online, community-driven wiki for information about the safe handling of nanomaterials. ... It is designed to be a practical tool for people who handle nanomaterials as well as an online repository of safety protocols." The guide is available at the site below. [July 2009. Military Implications, Sources³⁷⁸]

ILO Booklet on Workplace Hazards

According to Meridian Nanotechnology and Development News, the International Labour Organization has published a new booklet, *Emerging risks and new patterns of prevention in a changing world of work*, that summarizes key new occupational safety and health issues, including those related to technological innovations such as nanotechnology and biotechnology. [May 2010. Military Implications, Source³⁷⁹]

Comprehensive Review of Engineered Nanomaterials Health And Safety

A consortium led by Edinburgh Napier University and the Institute of Occupational Medicine published a 426-page final report of the project *Engineered Nanoparticles - Review of Health & Environmental Safety (ENRHES)*, described by Nanowerk News as "A comprehensive and authoritative review of the health and environmental safety of engineered nanomaterials [that] considers sources, pathways of exposure, [and] the health and environmental outcomes of concern". The report contains prioritized recommendations to aid policymakers in formulating regulations. [January 2010. Military Implications, Sources³⁸⁰]

Nanotechnology--Assessment of Health Safety and Environmental Factors

Frost & Sullivan, and Research and Markets, are offering a new research report, *Nanotechnology--Assessment of Health Safety and Environmental Factors (Technical Insights)*. According to the announcement, the report provides "an overview of the HSE implications of nanotechnology ... a forced field analysis of the industry drivers and challenges... [a] strategic evaluation of the possible initiatives... ...[and] Profiling of commonly used HSE nomenclature with a list of the ongoing research projects in North America and Europe." The report is available for €4533-€5928, depending on the scope of the license. [January 2010. Military Implications, Source³⁸¹]

Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology

Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology, according to a review, "makes a significant contribution to the issues it sets out to address, namely how government confronts conditions of acute uncertainty about environmental and health risks, and how, given such uncertainty, government structures its regulatory policy," And, Meridian Nanotechnology and Development News says, "it addresses the dilemma faced by governments wanting to satisfy the desire for scientific innovation while also taking into account the direct and indirect effects of such emerging technologies." [March 2010. Military Implications, Source³⁸²]

EU Efforts Underway to Improve Nanotech EHS Information

A new EU FP7 project will create a database on the health, safety and environmental impact of nanoparticles. The project, "Nano Health-Environment Commented Database (NHECD)," is coordinated by Professor Oded Maimon from Tel Aviv University, Israel. Also, Khara Deanne Grieger and colleagues of the research group Nanotechnology & Risk at the Technical University of Denmark (DTU) are working on identifying the gaps in knowledge of the environmental, health and safety impacts of nanomaterials. A systematic analysis of 31 reports and articles found that serious knowledge gaps exist in all areas of basic nanotech EHS

knowledge, viz., the lack of reference materials and standardization; environmental fate and behavior; human and environmental toxicity; test methods to assess, particularly, the effects; and commercial or industrial-related aspects (e.g. life cycle assessments). [July 2009. Military Implications, Source³⁸³]

Report Suggests Current Nanotech Protective Gear May Not Be Adequate

In a paper to be published in a journal next year, Patricia Dolez of the Dept. of Mechanical Engineering, at the École de technologie supérieure, in Montréal, and colleagues, point out possible problems with the adequacy of current workplace protective equipment when dealing with nanomaterials in the environment, and suggest that further research is needed into these special risks. [October 2009. Military Implications, Sources³⁸⁴]

Study Shows Toxicity Implications of Nanoparticle Size

Researchers at the Institute of Nanotechnology, National Chiao Tung University, Hsinchu, Taiwan, conducted a study on the effect of the size of gold nanoparticles on their toxicity in a mouse model. The work showed that injection of particles of 3, 5, 50, and 100 nm size had no harmful effects, but those ranging from 8 to 37 nm induced severe sickness in mice. [July 2009. Military Implications, Source³⁸⁵]

Study Shows Ill Effects of Multiwall Carbon Nanotubes

A new study at BASF SE produced evidence that inhaled multiwall carbon nanotubes can produce inflammation and other ill effects in rats at a "dose ... 200 times lower than an inhalation exposure level generically deemed to pose high concern through the United Nations' Globally Harmonized System of Classification and Labeling of Chemicals (GHS)," according to a scientist commenting on the results, as reported by the Bureau of National Affairs, and cited in Meridian's Nanotechnology and Development News. [July 2009. Military Implications, Source³⁸⁶]

Researchers Call for Broad Approach to Nanotube Risk Assessment

Enrico Bergamaschi and colleagues of the Department of Clinical Medicine, at the University of Parma (Italy) Medical School suggest in a recent paper that "we need a much more detailed toxicological approach to hazard assessment before judgement regarding the long-term safety of carbon nanotubes can be made," according to a story in Nanowerk News. They point out that "carbon nanotubes are a recent invention ... and so clinical and epidemiological evidence for any long-term effects they may have on human health are entirely lacking" and recommend that "we should combine experimental, clinical and epidemiological evidence ... [and] set up preventive measures as well as assess the need to implement periodic health examinations of employees exposed to carbon nanotubes." [September 2009. Military Implications, Sources³⁸⁷]

European Project to Study Metal Oxide Nanoparticle Risks

According to an item in Nanowerk News, CIC biomaGUNE, the Centre for Cooperative Research in Biomaterials, in Guipúzcoa, Spain, is to lead the European FP7 project HINAMOX (Health Impact of Engineered Metal and Metal Oxide Nanoparticles: Response, Bioimaging and

Distribution at Cellular and Body Level). The aim of the three-year project is to evaluate the possible impact on health of metal oxide nanoparticles, including zinc, cerium, titanium and iron oxides. [October 2009. Military Implications, Sources³⁸⁸]

Metallic Impurities Affect Carbon Nanotube Toxicity

According to a story in Highlights in Chemical Science, Martin Pumera and Yuji Miyahara of the National Institute for Materials Science, Ibaraki, Japan describe in a recent paper how “A main factor in nanotube toxicity are the metal contaminants that remain from manufacture, which are typically one to ten per cent by weight.” In a test, only 100 ppm of iron was needed to dominate the ability of five nanotube samples to reduce or oxidize two biomarkers - hydrogen peroxide and hydrazine. The story goes on to point out that this value is significantly lower than the detection limits of the methods routinely used to assess nanotube purity. [September 2009. Military Implications, Sources³⁸⁹]

Questions Raised on Reliability of In Vitro Nanomaterials Toxicity Testing

In talks, one self-characterized as provocative, at the National Science and Technology Council's workshop Nanomaterials and Human Health & Instrumentation, Metrology, and Analytical Methods, Prof. David Grainger of the Univ. of Utah and Dean Martin Philbert of the University of Michigan's School of Public Health raised serious questions about the reliability of in vitro tests for toxicity of nanomaterials and advocated more whole body research, basing their criticism on the variability of in vitro tests and the lack of knowledge of nanomaterial interactions in a full biological environment. [November 2009. Military Implications, Sources³⁹⁰]

New Results on TiO₂ Nanoparticle Toxicity to Cells

Scientists at UCLA's Jonsson Comprehensive Cancer Center have published the results of a study showing that a physicochemical reaction to ingestion of TiO₂ nanoparticles can induce DNA breaks, chromosomal damage, and inflammation in cells in various organs in a mouse model. [November 2009. Military Implications, Sources³⁹¹]

New Technique for Non-toxic Nanosilver

Andrea Travan and colleagues at the Dept. of Life Sciences, Univ. of Trieste, have reported a new method for rendering silver nanoparticle non-toxic to mammalian cells. (See Item 7.8.2, Wide Use of Nano-Silver Raises Health and Environmental Issues, in the June 2009 issue of this report.) The method involves immobilizing the particles in a hydrogel, so that they, “can exert their antimicrobial activity by contact with the bacterial membrane, but cannot [be] absorbed and internalized by eukaryotic cells,” according to an item in Nanowerk. [July 2009. Military Implications, Source³⁹²]

New Technique May Reduce Silver Nanoparticle Hazard

Scientists at the Laboratory of Polymer Chemistry at the University of Helsinki report success in chemically binding silver nanoparticles to a polymer, thereby reducing the likelihood of a silver particle finding its way from a product into the body. The details of the possible toxicity of silver nanoparticles are still being investigated. It is known that they do cause some cell damage. In the

proposed configuration, only silver ions escape, to exert their antimicrobial action. [February 2010. Military Implications, Source³⁹³]

Sodium Cholate Found to Be Safe Surfactant for Carbon Nanotubes

Prof. Lifeng Dong and associates at Missouri State University, Springfield MO, have shown that sodium cholate is an environmentally friendly surfactant for the purification and dispersion of single-walled carbon nanotubes, not affecting cell morphology, proliferation, or growth. [November 2009. Military Implications, Source³⁹⁴]

Device for Nanoparticle Study

Izon Ltd. of Christchurch, New Zealand, advertises a relatively inexpensive new device for the detection and measurement of nanoparticle. The qNano is a proprietary scanning ion occlusion spectroscopy (SIOS) platform for fluid-borne nanoparticle analysis. According to an announcement, it provides, "dynamically adjustable nanopores, enabling tunable, resistive pulse sensing over a wide particle size range." [July 2009. Military Implications³⁹⁵]

Lack of Standards for Engineered Nanoparticles in European Surface Waters

As reported by Meridian Nanotechnology and Development News, a recent article in the Journal of Environmental Monitoring "concludes that it is impossible to set limit values for engineered nanoparticles (ENPs) in European surface waters now and in the foreseeable future...due to the extensive lack of knowledge not only of toxic effects, degradability, and bioaccumulation of ENPs in the aquatic environment, but also due to the questionable validity of test systems and methods to establish environmental quality standards" and goes on to explain the role of the EU Water Framework Directive (WFD) as an environmental control. [November 2009. Military Implications, Sources³⁹⁶]

"Environmental and Human Health Impacts of Nanotechnology"

Topics covered in this ten-chapter book include: The properties, preparation and applications of nanomaterials; Characterization and analysis of manufactured nanoparticles; The fate and behaviour of nanomaterials in aquatic, terrestrial and atmospheric environments; Ecotoxicology and human toxicology of manufactured nanoparticles; Occupational health and exposure of nanomaterials; and Risk assessment and global regulatory and policy responses. [December 2009. Military Implications, Source³⁹⁷]

"Nanoethics: Big Ethical Issues With Small Technology"

According to the Nanowerk News review, "This book explores in an accessible and informative way how nanotechnology is likely to impact the lives of ordinary people in the coming years and why ethical reflection on nanotechnology is needed now. Articulate, provocative and stimulating, this timely book will make a significant contribution to one of the most important debates of our time." Military applications is one of the topics discussed. [December 2009. Military Implications, Sources³⁹⁸]

UK Solicits Participation in Nanotech Policy Formulation

The UK government, "is developing a strategy for nanotechnologies to build on existing actions, recommendations and strategies, and ensure that everyone in the UK can benefit from the societal and economic opportunities that these technologies may offer whilst addressing the challenges that they might present." In aid of this, the Dept. for Business, Innovation & Skills has opened a Web site to solicit input from, "everyone from researchers, businesses, regulators and policy makers to third sector organisations and the general public," and is, "seeking ... views on current and future opportunities and challenges, the effectiveness of existing policies and what changes or new initiatives might be needed in the future." [July 2009. Military Implications, Source³⁹⁹]

UK House of Lords Committee Urges Nanosafety Transparency

Nanotechnologies and Food, a 112-page report presented by the UK House of Lords science and technology committee, urges, "the government and research councils to carry out more checks into the use of nanomaterials in food and in particular the dangers for the human body." This call is the third in two years, following those for more stringent safety checks from the Royal Society and the Royal Commission on Environmental Pollution. [January 2010. Military Implications, Sources⁴⁰⁰]

UK Report Calls on Government to Support Nanotech Risk Assessment

According to a story in the Financial Times, a report just issued by the UK's Nanotech Knowledge Transfer Network calls, "for the government to assuage public fears over nanotechnology by supporting risk assessments of new products", especially on behalf of small start-ups that may not have the resources for such activities. [January 2010. Military Implications, Source⁴⁰¹]

UK Nanotech EHS Directory Published

The UK's Nanotechnology Knowledge Transfer Network has published the UK Nanotechnology Health, Safety and Environment Directory 2009, listing more than 30 institutes, government departments, networks and commercial service providers that are recognized as contributing in some way to the EHS debate. [November 2009. Military implications, Sources⁴⁰²]

UK Defra Committee Report on Nanosilver

The Advisory Committee On Hazardous Substances of the UK Department for Environment, Food and Rural Affairs (Defra) has issued its report on nanosilver. The paper (7 pp, with references) states that it reviews information and studies on the environmental exposure and effects of nanoparticulate silver, comments on known or predicted environmental exposure levels and whether these present a human health or environmental risk, and considers what action should be taken to further develop understanding in this area. It does not comment on risk management issues because of insufficient information and because those are the responsibility of the relevant policy and regulatory bodies. [December 2009. Military Implications, Source⁴⁰³]

UK Nanotechnologies Strategy: Small Technologies, Great Opportunities report

The UK government published *Nanotechnologies Strategy: Small Technologies, Great Opportunities*, a comprehensive overview of all aspects related to regulations, standardization, policies, and strategies for advancement of nanotechnology in a safe and economically sound way. According to Meridian Nanotechnology and Development News, "The overall aims of the strategy are as follows: 1. Transparent, integrated, responsible and skilled nanotechnologies industry with good links to, and support from Government; 2. Better understanding of the risks associated with the use of, and exposure to, nanomaterials, and enough people with the right skills to assess them; 3. Better informed policies and regulations relating to nanomaterials and nanotechnologies; and, 4. Well-informed public and stakeholders and a leading position on nanotechnologies for the UK on the world stage." [March 2010. Military Implications, Sources⁴⁰⁴]

Norwegian Research Group Launches Nanotech Particles Project

The SINTEF Group, the largest independent research organization in Scandinavia, has established a project, 'The environmental fate and effects of SINTEF-produced nanoparticles', to investigate the behavior and effects of nanoparticles in marine environments. Several other nanotech-oriented efforts are also underway in the Group. [October 2009. Military Implications, Sources⁴⁰⁵]

New Centre for Nano Safety Established in Scotland

Edinburgh Napier University has set up a new Centre for Nano Safety as "a multi-disc[i]plinary centre addressing the potential human and environmental effects of nanomaterials, incorporating human and environmental toxicology as well as microbiology." [November 2009. Military Implications, Sources⁴⁰⁶]

Tunisia Sets Up Unit for Environmental Applications and Nanotechnology

In Tunisia, the National Agency of Environmental Protection (ANPE) and the Tunisian Association of Nanotechnology have set up a partnership for the creation of a unit for nanotechnology research and environmental applications of nanotechnology. [December 2009. Military Implications, Source⁴⁰⁷]

First Sri Lankan Information Portal for Nanotechnology

The Sri Lanka Institute of Nanotechnology Pvt. Ltd (SLINTEC) has announced the launch of the first Sri Lankan information portal for nanotechnology, < www.susnanotec.lk >, an interactive site that will act as an information hub for nanotechnology research in Sri Lanka. According to the announcement, "The purpose of the website [is] creating awareness on nanotechnology amongst students, educate potential investors and clients on the research being done, enable the government to measure the performance of funding, provide a forum for scientists to share their thoughts, attract potential human resources, satisfy public curiosity and aid business sector decision makers in their planning and evaluation of nanotechnology." [April 2010. Military Implication, Source⁴⁰⁸]

NGO Coalitions Raise Doubts about Nanotech and the Environment

According to an article in Nanowerk News, cited in Meridian Nanotechnology and Development News, "Two international coalitions of non-governmental organizations (NGOs) are challenging industry claims about the potential environmental benefits provided by nanotechnology products. The groups, the European Environmental Bureau and the International POPs Elimination Network (IPEN) Nanotechnology Working Group, state that emerging evidence is showing that the claims put forth by industry regarding nanotechnology do not provide the whole picture, and that environmental risks and costs are being trivialized or ignored." [July 2009. Military Implications, Source⁴⁰⁹]

Study Shows Nano Damage Differs by Medium, Target Kingdom

Research by Prof. Pu-Chun Ke of Clemson Univ. indicates that the biological damage from carbon nanoparticles varies both with the state of the particles (pristine vs. well-functionalized fullerene) and whether the target cells are plant or mammalian, reports a story in nanowerk.com. [March 2010. Military Implications, Source⁴¹⁰]

New Technique Allows Study of Nanoparticles in Embryos

Prof. David Cramb of the Univ. of Calgary Chemistry Dept. and colleagues report development of a methodology to measure various aspects of nanoparticles in the blood stream of chicken embryos. This will allow measurement and understanding of nanoparticle uptake into embryonic tissues, to aid in bioaccumulation studies involving embryos. [March 2010. Military Implications, Sources⁴¹¹]

Guide for Unbound Nanoparticles in Occupational Settings

According to Meridian Nanotechnology and Development News, ASTM International offers for purchase its Standard Guide for Handling Unbound Engineered Nanoscale Particles in Occupational Settings, which, in addition to providing handling principles and techniques, describes actions that can be taken to minimize human exposure to the particles. [March 2010. Military Implications, Source⁴¹²]

Worldwide Nanotech Labs Deficient in EHS Protection

According to a story in Meridian Nanotechnology and Development News, "Researchers at the University of Zaragoza, Spain, found, by conducting an online survey, that most researchers who handle nanomaterials that could become airborne do not use suitable personal and laboratory protection equipment." The survey indicated that 25% of the nanotech labs did not use any type of protection and many of the labs disposed of nanomaterials in the same way as other chemicals. [February 2010. Military Implications, Sources⁴¹³]

Australian Group Releases Two Workplace Nanosafety Reports

Safe Work Australia has announced the release of two research reports on engineered nanomaterials, Engineered Nanomaterials: Evidence on the effectiveness of workplace controls to prevent exposure, prepared by the Royal Melbourne Institute of Technology, and Engineered

nanomaterials: A review of the toxicology and health hazards, researched by Toxikos Pty Ltd. [November 2009. Military Implications, Sources⁴¹⁴]

New Nanotech Survey Book Covers Environmental Aspects

A new book, Nano-Society - Pushing the boundaries of technology (ISBN: 978-1-84755-883-1), surveys 122 nanotech research projects, grouped into four sections, one of which, Simply Green – Environmental Applications and Risk Management, covers Green nanotechnology, Dealing with pollution, Energy – renewable and clean, and Nanotoxicology – assessing the risks. [October 2009. Military Implications, Sources⁴¹⁵]

What Is Nanotechnology and Why Does It Matter? Book on Nanotechnology and Ethics

Nanoethics Group announced the release of a new book, *What Is Nanotechnology and Why Does It Matter?: From Science to Ethics*, published by Wiley-Blackwell and resulting from a collaboration between ethicists and nanotechnology scientists. The book comprises three units. Unit 1 — What is Nanotechnology; Unit 2 — Risk, Regulation, and Fairness— risk, precaution, regulation, equity, and access. Unit 3 —Ethical and Social Implications— urgent issues: environment, military, privacy, medicine, and enhancement. [March 2010. Military Implications, Source⁴¹⁶]

Paper Examines "Nanotechnology: Safe By Design?"

As summarized by Meridian Nanotechnology and Development News, this paper discusses the idea that the safety aspects of nano products can be ensured by proper design, pointing out the difficulties of identifying the specific physical and chemical properties that produce the distinct sets of beneficial or adverse effects, and manipulating those properties to produce the final product objective. [March 2010. Military Implications, Source⁴¹⁷]

Paper Reviews Nanotech Remediation of Waste Sites

Dr. Barbara Karn of EPA's National Center for Environmental Research and colleagues have published a paper, Nanotechnology and In Situ Remediation: A Review of the Benefits and Potential Risks. It was written, "...to focus on environmental cleanup and provide a background and overview of current practices, research findings, societal issues; potential environment, health and safety implications and future directions for nanoremediation..." of waste sites. The paper includes 76 references. A Nanoremediation Site Map developed in conjunction with the paper can be found at http://www.nanotechproject.org/inventories/remediation_map/ [February 2010. Military Implications, Sources⁴¹⁸]

Biotechnology

New EU Body Recommended for Assessing Human Enhancement

Advances in biological technologies to increase human capabilities are accelerating. These are expected to have profound implications for the future of civilization and what it means to be human. Future schisms between those who are enhanced or favor enhancement vs. those who are

not enhanced or oppose human enhancement are possible. Frameworks to understand, monitor, and regulate such advances are lacking. A European Parliament-requested study on these issues recommended improved public understanding and establishment of a European body for monitoring human enhancement technologies (HET) within and outside Europe in order to develop a normative framework that would guide the formulation of EU policies. [July 2009. Military Implications, Sources⁴¹⁹]

Genetic Patenting and GMO Face New Challenges

A National Research Council study on the impacts of GM crops on economic and environmental security found that at least nine species of weeds in the U.S. have developed resistance to glyphosate since the introduction of GM crops in 1996. Glyphosate is a major component in commercial herbicides and GM crops are designed to tolerate it. Insufficiently diverse farming practices and excessive reliance on a single technology could undermine the economic and environmental benefits of GMOs use. In the U.S., GM crops account for more than 80% of soybeans, corn, and cotton.

The first U.S. federal ruling declaring patents on genes invalid concerns the BRCA 1 and 2 genes (related to breast and ovarian cancers), and was made on the grounds that it is “a valuable scientific achievement ... but ...not ...something for which they are entitled to a patent”. Approximately 2,000 human genes (20% of the human genome) are currently covered by patents, including those associated with certain degenerative disorders and cancers. The ruling may have broad implications for the validity of gene patents in general, including patents on GMOs. [April 2010. Military implications, Sources⁴²⁰]

U.S. Should Launch a New Biology Initiative

A New Biology for the 21st Century: Ensuring the United States Leads the Coming Biology Revolution, a report from the National Research Council, assessing the state of use of recent advances in biology, concludes that the design, manipulation, and prediction of complex biological systems needed for practical applications are “well beyond current capabilities.” To accelerate the implementation process, the report recommends a National New Biology Initiative, with an interagency and interdisciplinary approach and a timeline of at least ten years and funding in addition to current research budgets. The report underlines that the initiative could also be used to address environmental issues by making it possible to monitor ecosystems and diagnose and repair ecosystem damage. [October 2009. Military Implications, Source⁴²¹]

Computer technology and cyberspace

International Legal Frameworks Needed for Cybersecurity

After land, sea, air, and space, cyberspace became the “fifth battlespace” on the agenda of security experts. The next ‘Pearl Harbor’ is likely to be a cyberattack, says CIA director Leon Panetta. The disruption of critical infrastructure such as water or electricity by cyberattacks in an IT-dependent world calls for exceptional strategies. “A new legal and policy framework is needed for addressing cybersecurity challenges”, noted Lt. General Keith A. Alexander, nominee to head the Pentagon’s new CyberCommand in testimony before the U.S. Congress, April 15, 2010. Some experts identify three levels of severity for cybersecurity: cybercrime,

cyberespionage and reconnaissance, and cyber-leveraged war. There are documented massive cyberespionage schemes such as the one managed from China against several countries (including India and Pakistan). Additionally, electromagnetic pulses could be used for destroying critical infrastructure (see item *International Standards Needed to Reduce Hi-tech SIMAD Threats* in May 2009 environmental security report.)

Efforts to improve managing cyber-leveraged war, so that damage is contained and reduced, include NATO's recent gathering of top cyber-minds to address the evolution of conflict in an Internet-dependent world, and National Security Agency and other cyber security experts' participation in the Cyber Defense Exercise (CDX) hosted by Lockheed Martin - Greenbelt (for the eighth year). The European Commission will conduct a feasibility study for creating a body that would assess trends in cybercrime across the EU and facilitate harmonization of related legislation among the different legal systems of the 27 EU countries (while the EU states have yet to ratify the Convention on Cybercrime adopted in 2001). In the meantime, there are proposals to include in the WEEE directive (for waste electrical and electronic equipment) provisions to facilitate protection of data stored on discarded devices. [April 2010. Military Implications, Sources⁴²²]

Space Technology

Reconsidering the Rules for Space Security

Reconsidering the Rules for Space Security by Nancy Gallagher and John D. Steinbruner reviews the current regulations that currently govern the use of space and the relevancy of the 1967 Outer Space Treaty. It argues that the U.S. should advance international negotiations based on the Treaty for developing new rules that explicitly address problems of space security, to specifically outlaw weaponization of space, and define the legitimate limits of space-based support for military missions. Some practical recommendations for successful negotiations include strategies for equitable distribution of the costs of compliance systems. [October 2009. Military Implications, Source⁴²³]

European Space Agency First International Security Symposium

On February 9-10, 2010, the European Space Agency will hold its First International Security Symposium to "share information on security approaches, challenges and evolution that international organizations face in the current geopolitical situation." [January 2010. Military Implications, Source⁴²⁴]

The Chaos Caused by the Volcanic Eruption in Iceland Revealed Lack of a Global Framework to Deal with Large-Scale Air Traffic Disturbances

The total or partial closure of 313 European airports (75% of the European airport network) in the period April 15-21 due to the ash cloud following the eruption of Iceland's Eyjafjallajökull volcano affected over 100,000 flights, 10 million passengers, and loss of €2.5 billion (\$3.31 billion). The concurrent decision-making chaos exposed the lack of an adequate international framework and coordination strategy to deal with such large-scale disruptions (natural or manmade). The event might lead to new EU agreements such as the "Single European Sky" project, establishment of a single air network management solution, harmonization of all

aviation-related national regulations, and eventually the creation of a global response strategy. The number and scale of air traffic disruptions could increase due to a combination of increasing travel and the larger scale of unexpected natural (and/or manmade) events as climate change continues. [April 2010. Military Implications, Sources⁴²⁵]

Nuclear Safety

Nuclear Nonproliferation Treaty Review Conference Adopted Document for Reducing Nuclear Threat

The Nuclear Nonproliferation Treaty five-yearly review conference unanimously approved a final document setting out a number of measures to reduce nuclear risk, based on the three pillars of the treaty: disarmament, non-proliferation, and promoting peaceful atomic energy. It includes, inter alia, a commitment by the five nuclear powers to expedite nuclear disarmament efforts and reduce the role of atomic weapons in their military policies; a conference scheduled for 2012 on establishing a Middle East zone free of nuclear and other weapons of mass destruction; and resuming India and Pakistan peace talks in July. The conference took place May 3-28, 2010 at UN Headquarters in New York, attended by representatives of the accord's 189 member nations. Meantime, Chad became the 100th nation ratifying the Additional Protocol giving IAEA enhanced access to information on its nuclear activity. [May 2010. Military Implications, Sources⁴²⁶]

IAEA Database Recorded 1,562 Nuclear Trafficking Incidents for the Period 1993–2008

The International Atomic Energy Agency reports that in 2008, 119 events were added to the agency's Illicit Trafficking Database. Fifteen of those were cases of illicit nuclear material possession or related incidents and 16 were cases involving the theft or loss of sensitive substances. Between 1993 and the end of 2008, the database had recorded 1,562 nuclear trafficking incidents, ranging from illicit disposal efforts to nuclear material of unknown provenance. As of the end of 2008, 103 IAEA member states participated in the reporting program. [August 2009. Military Implications, Sources⁴²⁷]

Advancements on Denuclearization

The new Strategic Arms Reduction Treaty (START) signed by the U.S. and Russia (together holding more than 90% of the world's nuclear weapons) requires each to reduce their strategic nuclear arsenal to 1,550 deployed warheads (from the present 2,200-weapon limit) and to 800 launchers within seven years. The Treaty will enter into force after being approved by the two countries' legislatures. Critics note that the treaty doesn't address the disposal of the nuclear material contained in the weapons. Also, the newly released U.S. Nuclear Posture Review aims to reduce the role of nuclear weapons in the U.S. national security strategy. A two-day nuclear security summit held in Washington DC, gathering leaders of 47 nations, addressed measures to secure vulnerable nuclear materials by 2014 and avoid nuclear terrorism.

Egypt plans to increase pressure for beginning negotiations before 2012 for establishing a nuclear weapon-free Middle East. The Malaysian Strategic Trade Bill vigorously enforces legislation concerning illicit trafficking of WMD materials or technology. Meanwhile, in India, the proposed law limiting the liability to foreign nuclear power companies in the event of an

accident triggers worries over potential lax safety standards and nuclear disaster. [Related item: *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.] [April 2010. Military Implications, Sources⁴²⁸]

The US/Russia negotiations for a legal framework to replace the Strategic Arms Reduction Treaty (START I), which expired on December 5, 2009, are expected to be restarted in mid-January 2010. Meantime, they pledged to continue working “in the spirit” of the 1991 pact. Reportedly, a major cause of the delay in concluding a new treaty is disagreement over compliance verification mechanisms. However, failure to reach agreement before the next Review conference might jeopardize nuclear non-proliferation advancements.

Meantime, the UN General Assembly, acting on the recommendation of its Disarmament and International Security Committee, adopted 16 texts in the nuclear weapons category, including a resolution naming August 29 as the international day against nuclear tests; beginning of negotiations in 2010 for a treaty for banning fissile material use for nuclear weapons; and a renewed determination towards the total global elimination of nuclear weapons (adopted by an overwhelming margin, with only India and North Korea voting against, and Bhutan, China, Cuba, France, Iran, Israel, Myanmar and Pakistan abstaining). The report “Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers” by the International Commission on Nuclear Non-proliferation and Disarmament evaluates the threats and risks associated with the existing nuclear weapons, highlighting their potential use by accident, miscalculation or design, or falling into the hands of terrorist actors, and calls upon nations with nuclear arms to adopt a “no first use” stand, as well as a reduction of nuclear arsenal to 2,000 weapons by 2025, roughly 10% of today’s stockpile. The 230-page report compares nuclear weapons to climate change in terms of gravity, although underlining their much higher potential immediate impact. [December 2009. Military Implications, Sources⁴²⁹]

Dialogues for Creating a Northeast Asia Nuclear Weapon-Free Zone

Representatives of the Japanese and Republic of Korea parliaments held the first in a series of regional parliamentary dialogues for creating a Northeast Asian Nuclear Weapons-Free Zone. The joint declaration calls on the governments of the Republic of Korea and Japan to advance the proposal at the May 2010 Non-proliferation Treaty (NPT) Review Conference. The subject was also informally discussed by the Parliamentarians for Nuclear Non-proliferation and Disarmament (PNND) with UN Secretary-General Ban Ki-moon, and with government officials of Japan, Korea, and the United States. [Related item: *Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties* in August 2009 environmental security report.]

In the meantime, Australia and Japan submitted a proposal for the NPT Review Conference containing 16 nuclear disarmament and nonproliferation measures for achieving a world without nuclear weapons and a successful outcome at the NPT review conference. [March 2010. Military Implications, Sources⁴³⁰]

Waste Management

Renewed Calls for Strengthening E-Waste Management Regulations

According to a UNEP report “Recycling - from E-Waste to Resources,” e-waste grows globally by 40 million metric tons a year and is expected to rise dramatically in the developing countries, which are vulnerable to illegal trafficking of hazardous waste unless regulations are strengthened and enforced. Computer waste in India alone is projected to grow by 500% by 2020 compared to 2007 levels. China, Brazil, and Mexico are also among the countries highly vulnerable to rising environmental damage and health problems from hazardous waste. Nevertheless, properly managed e-waste could represent business opportunities, by creating new jobs and income from recovering valuable materials, such as gold and copper. [Related items: *Hazardous Waste Disposal of Increasing Concern* in September 2009, *Organized Crime Targets Electronic Waste Recycling* in July 2009, and other previous environmental security reports.]

The European Commission is exploring creation of a new body dedicated to enforcing European waste regulations, as recommended by its recent “Study on the feasibility of the establishment of a Waste Implementation Agency”. In the EU, an estimated 2.6 billion metric tons of waste are generated each year, out of which about 90 million metric tons are classified as hazardous. A recent large-scale inspection involving 22 Member States and some neighboring countries found that around 19% of waste shipments were illegal, most destined to countries in Africa and Asia. [Related items: *Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?* in April 2008, *EU Updates the REACH System, and WEEE and RoHS Directives* in December 2008, and other previous environmental security reports.] [February 2010. Military Implications, Sources⁴³²]

Organized Crime Targets Electronic Waste Recycling

A series of raids in the UK to enforce the EU's Waste Electrical and Electronic Equipment Directive (WEEE) revealed increased involvement of organized crime in illegal export of unrepairable electric and electronic equipment to developing countries, mostly in Africa. Organized crime is primarily interested in retrieving some valuable parts of those devices. Dumping as well as dismantling of electronic waste in developing countries in Africa and Asia represents a serious threat to human health and the environment. [Related items: *EC's WEEE Directive Goes into Effect in UK* in July 2007, *Waste Management Policies* in June 2008, and *Toxic Waste Disposal of Global Growing Concern* in September 2006 environmental security reports.] [July 2009. Military implications, Source⁴³³]

Hazardous Waste Disposal of Increasing Concern

According to the European Environment Agency, paper, plastic, and metal trash exported from Europe rose tenfold from 1995 to 2007, with 20 million containers of waste now shipped each year; either legally or illegally. In 2008, the Netherlands returned 80 illegal shipments to their countries of origin. Hong Kong authorities say that about 100 containers of waste arrive daily from the US and Canada. Recently, Italian mafiosi confessed that they have been disposing of toxic waste by putting it onboard ships and then deliberately sinking the vessels. [Related items: *Organized Crime Targets Electronic Waste Recycling* in July 2009, *Toxic Waste Disposal of Global Growing Concern* in September 2006 and other environmental security reports.]

Participants in the first international E-Waste Summer School, in Eindhoven, Netherlands, September 6-11, recommended adopting global policies and standards for recycling electronic products to avoid illegal and harmful e-waste processing practices in developing countries. [September 2009. Military implications, Sources⁴³⁴]

European Commission to Strengthen Bio-Waste Management

The European Commission has published a strategy for improve bio-waste management and help meet the targets set by the Landfill Directive 1999/31/EC that requires Member States to reduce the amount of biodegradable waste that they landfill to 35% of 1995 levels by 2016. The Commission's strategy aims to reduce bio-waste environmental impact while also taking advantage of its potential as a renewable source of energy and recycled materials, as well as reducing the production of methane (a GHG 25 times more potent than CO₂). The Commission estimates that bio-waste is accounting for 88 million tons of municipal waste each year in Europe, while about 2% of the EU's overall renewable energy target could be met if all bio-waste was turned into energy. To support Member States, the EU will provide specific guidance, standards, and indicators for bio-waste prevention with possible future binding targets. [May 2010. Military Implications, Sources⁴³⁵]

Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and Toxic Waste Threat

Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, supported by a consortium of national and international organizations, are taking measures to reduce the threat posed by nuclear and hazardous material left over from the Soviet era. Some 800 million tons of radioactive and toxic waste are stored in vulnerable depots, threatening both general environmental contamination and specific contamination of the water supplies of millions of people, and increasing "dirty bomb" threats. A declaration adopted at Geneva on June 29, 2009, outlines the main actions to address the problem, including regulatory frameworks and capacity building. [Previous related item: *Central Asia Becomes Nuclear Weapon-Free Zone* in December 2008 environmental security report.] [July 2009. Military Implications, Sources⁴³⁶]

IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS

EU to Introduce New Environmental Index

In order to better measure progress, the EU Commission plans to develop a comprehensive index of environmental sustainability, which would include indicators on the main environmental policy and protection aspects. The index would complement the Gross Domestic Product (GDP), thus helping sustainable development policies. A pilot version of the index will be presented in 2010. The European Statistical System will also implement Environmental Accounting as a standard in macro-economic statistics, while the Commission will speed up environmental and social data generation for producing near real-time information for decision-making. [October 2009. Military Implications, Sources⁴³⁸]

European Commission Creates New Directorate-General for Climate Action

The EC's new Directorate-General for Climate Action will take over the relevant activities from the other EC DGs, and those related to international negotiations on climate change from the External Relations DG. This should give more focus and effectiveness for the EU's role in world efforts to address climate change. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.] [February 2010. Military Implications, Source⁴³⁹]

European Agency for the Cooperation of Energy Regulators to Become Operational in March 2011

The new European Agency for the Cooperation of Energy Regulators (ACER) will complement and coordinate the work of National Regulatory Authorities, supporting the liberalization of the energy markets and the creation of European network rules. While encouraging international cooperation and integration to achieve energy security and combat climate change, the agency might restrict national policymaking, as its decisions will be binding. Its tasks involve advancing green energy development policies (potentially including a European 'supergrid'.) The Agency will open in March 2011, in Ljubljana, Slovenia. [March 2010. Military Implications, Sources⁴⁴⁰]

UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty

The UN Security Council endorsed a resolution aiming to advance global nuclear disarmament. Measures include: discouraging withdrawal from the Nuclear Nonproliferation Treaty, increasing membership in the Comprehensive Nuclear Test Ban Treaty, and creating additional nuclear weapon-free zones. Non-compliance with the Nuclear Nonproliferation Treaty would be referred directly to the Security Council for possible punitive action, rather than to the International Atomic Energy Agency. [September 2009. Military Implications, Sources⁴⁴¹]

New Measure to Enforce Maritime Environmental Protection

The Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) 60th session held March 22-26, 2010, made further steps to strengthen maritime environmental regulations, such as:

- adopted amendments to the MARPOL Convention to formally establish a North American Emission Control Area in which emissions of sulphur oxides (SOx), nitrogen oxides (NOx), and particulate matter from ships will be subject to more stringent controls than the limits that apply globally—expected to enter into force on August 1, 2011
- adopted a new MARPOL regulation to protect the Antarctic from pollution by heavy grade oils—expected to enter into force on August 1, 2011
- worked on developing guidelines related to safe and environmentally sound ship recycling, and agreed on the need to develop guidance concerning the recycling of flag-less and non-Party ships by Parties to the Convention—progress to be reported to MEPC 61
- agreed that the discharge requirements for the Wider Caribbean Region Special Area under MARPOL Annex V Regulations for the prevention of pollution by garbage from ships are to take effect on May 1, 2011

- prepared draft text on mandatory requirements for the Energy Efficiency Design Index (EEDI) for new vessels and on the Ship Energy Efficiency Management Plan (SEEMP) for all ships in operation; but negotiations continue on details, including target dates and reduction rates
- in order to advance work on measures to regulate and reduce greenhouse gas (GHG) emissions from international shipping, the Committee decided to establish an intersessional Working Group on technical and operational measures to increase the energy efficiency of ships and an Expert Group to assess the impact of various market-based instruments for international maritime transport—both to report to the MEPC 61st session, to be held in September 2010.

[Related items: *Tougher Global Limits Imposed on Air Pollution from Large Ships* in October 2008 and other previous environmental security reports.] [March 2010. Military Implications, Source⁴⁴²]

The UK government has created the world's largest marine reserve (545,000 sq km) around the Chagos Islands, regarded as one of the world's richest marine ecosystems. The sixth session of the Conference of the Parties (COP) to the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean adopted a 25-year program of action for efficient management of the marine and coastal environment in the larger Eastern and Southern African region, as well as a Protocol to the Convention considering new emerging issues, such as climate change and the need for an ecosystem-based management approach. [April 2010. Military Implications, Sources⁴⁴³]

Observation and Information System for the World's Oceans to be Created

Confirming that a systematic scientific analysis of the oceans and seas is needed, the OceanObs'09 (for ocean observatories) meeting held September 21-25, 2009, at Venice, Italy decided to build a comprehensive observation system for monitoring the marine environment, assessing longer term trends and promoting sustainable marine resources management. UNESCO announced that the first globally integrated oceans assessment system could be delivered under the auspices of the UN by 2014. In the meantime, the U.S. National Science Foundation and the Consortium for Ocean Leadership have signed a Cooperative Agreement as the next step toward construction of the Ocean Observatories Initiative, "a network of ocean observing components, and their associated cyberinfrastructure, that will allow scientists to examine ocean processes on global, regional and coastal scales." [September 2009. Military Implications, Sources⁴⁴⁴]

Consumer's Handbook for Reducing Solid Waste

The booklet "Consumer's Handbook for Reducing Solid Waste" describes how individual consumers can help alleviate modern society's mounting solid waste problem by making environmentally aware decisions about everyday needs. It outlines many practical steps to reduce the amount and toxicity of solid waste. [November 2009. Military implications, Sources⁴⁴⁵]

Summary of European Battery Regulations Released

The environmental consulting firm Enhesa has published its 2009 Batteries Report, with a detailed comparative analysis of the regulatory requirements, including take-back and disposal, in nine European countries compared to the EU Batteries Directive 2006/66/EC. [December 2009. Military Implications, Sources⁴⁴⁶]

World Bank Development Indicators Database Available Free

The World Bank has made freely available online < <http://data.worldbank.org/> > its databases of more than 2,000 indicators from countries around the world, many with historical data for 50 years. This includes a large section on the environment. [April 2010. Military Implications, Source⁴⁴⁷]

INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

More than 30 New International Food Safety Standards Adopted

The Codex Alimentarius Commission adopted more than 30 new international standards, codes of practice, and guidelines concerning dangerous bacteria and chemicals in food. [July 2009. Military Implications, Source⁴⁴⁹]

Software Standards to Connect Data Globally

Denis Havlik of the Austrian Institute of Technology is coordinating an EU FP6 project, Sensors Anywhere (SANY), which embodies the technical capability to allow the free exchange and use of environmental monitoring data regardless of its source. SANY allows a user to search for and retrieve raw or processed environmental data using standardized methods and to receive it in a standard format set out by the Open Geospatial Consortium (OGS).

In another project with a related goal, the University of New Mexico, the Oak Ridge National Laboratory, and associated institutions worldwide are beginning work on establishing DataONE, a global data access and preservation network "for organizing and providing large amounts of highly diverse and interrelated but often incompatible scientific data", according to ORNL's Robert Cook. [November 2009. Military Implications, Sources⁴⁵⁰]

Emerging International Packaging Standards to Reduce Environmental Footprints

The first meeting of the ISO TC122 SC4 Packaging and Environment committee was held in Stockholm to begin work on standards for reducing the environmental footprint of packaging. The standards will cover source reduction, reuse, recycling, energy recovery, chemical recovery, composting and biodegrading, and a seventh overall standard. The new international standards are expected to be finalized by mid-2012 and to consider existing packaging and environmental standards already in use in Europe and Asia. [December 2009. Military Implications, Sources⁴⁵¹]

Only Very Low-Energy Buildings to Be Built in EU after 2020

The new EU energy efficiency legislation for buildings requires all Member States to alter their building codes so that all new buildings meet high energy-saving standards from the end of 2020

if private, and two years earlier if public constructions, while existing buildings will have to be upgraded where possible. The directive is part of the wider 20/20/20 EU energy efficiency legislative package. [May 2010. Military Implications, Source⁴⁵²]

POLLUTION

The Oil Spill Likely to Initiate International Regulations Discussions and Accelerate Alternative Energy Developments

The British Petroleum (BP) oil spill in the Gulf of Mexico has alerted the world to the need for better regulatory environments, safety systems and response capacity, and the need to accelerate efforts for alternative sources of energy. It could also fuel disputes between oil corporations and local populations such as those in Peru, Ecuador, and Nigeria. Given the international implications of the environmental consequences of dangerous oil offshore exploration and polluting oil sands, as well as the fact that most operating companies are foreign and/or multinational corporations, international regulations (beyond national criminal penalties) are likely to be created. [May 2010. Military Implications, Sources⁴⁵⁴]

EPA Warnings on Various Potential Health Hazards

The Environmental Protection Agency has issued a final Federal Register notice designating 31 areas throughout the U.S. as “nonattainment” and “unclassifiable/attainment” for the 24-hour national air quality standards for fine particulate matter, also called PM2.5. These communities will have to formulate plans for reducing fine particle pollution.

Another EPA announcement warns that high levels of PCBs can readily occur in the caulking material used in buildings built or renovated from 1950 to 1978, and that there is a continuing risk to personnel from exposure to PCBs in the material around doors and windows, and in the joints between masonry products such as brick or concrete block. [October 2009. Military Implications, Sources⁴⁵⁵]

Studies Show Increased Hazards from Some Types of Airborne Particles

Latest research reveals that certain kinds of airborne metallic microparticles, such as nickel, vanadium, and carbon, appear to pose a much higher toxic risk than other materials, putting acute stress on the lungs and heart. Low grade oil, such as is used in diesel trucks and space heaters, is a major source in urban areas. Scientists stress that more work needs to be done to study the relationships between particulate composition and biological harm. [December 2009. Military Implications, Source⁴⁵⁶]

Study Reveals Extensive Danger from Lead in Foreign Paints

A new study reveals that approximately 73% of consumer paint brands tested from 12 countries in Africa, Asia, and South America exceeded the former U.S. standard of 600 parts per million (ppm) for lead in paint (now 90 ppm), with 69% of the brands having at least one sample exceeding 10,000 ppm. “A global ban on lead-based paint is drastically needed” underlines main author, Dr. Scott Clark, professor of environmental health at the University of Cincinnati. [August 2009. Military Implications, Source⁴⁵⁷]

Low-fume Paint Requirements Spread

Illinois recently passed a law requiring the use of low-VOC (volatile organic compounds) paints; many other states already have such laws or are expected to enact them, and manufacturers are modifying product lines to meet similar requirements in other parts of the world. VOCs in paints and other finishes have been shown to present serious health hazards. [Previous related item: *Models for Photochemical Pollution Assessment in Urban Areas* in June 2006 environmental security report.] [July 2009. Military Implications, Sources⁴⁵⁸]

European Environment Agency Draws First Map of Europe's Noise Exposure

The European Environment Agency has launched the most comprehensive map of noise exposure, NOISE (Noise Observation and Information Service for Europe). Using database map software, map products show the numbers of people exposed to noise generated by air, rail and road traffic across Europe and in 102 large urban agglomerations. NOISE is expected to help enforce the Environmental Noise Directive adopted in 2002 and to reduce human noise exposure. [November 2009. Military Implications, Source⁴⁵⁹]

Greenhouse Gas Emissions Increase Ocean Noise Pollution

New research reveals that oceans are becoming noisier due to declines of the concentration of chemicals that absorb sound as result of ocean acidification caused by increased concentrations of CO₂. Model simulations show that increased acidity could reduce sound absorption (mostly of lower frequency range) by 60% by 2100 in high latitude oceans, potentially affecting marine life. The study, published in the journal *Nature Geoscience*, was conducted by researchers at the University of Hawaii School of Ocean and Earth Science and Technology. [December 2009. Military Implications, Sources⁴⁶⁰]

3. Military Implications and Sources

¹ Pentagon's Quadrennial Defense Review Addresses Climate Change

Military Implications:

In addition to the obvious responsibilities resulting from the report, the military should widely publicize the QDR to counterparts, as well as government and international agencies with security or environmental security-related responsibilities, as a flagship document addressing security issues related to climate change.

Sources:

The Quadrennial Defense Review (QDR)

<http://www.defense.gov/qdr/>

Pentagon review to address climate change for the first time

<http://thehill.com/homenews/administration/78855-pentagon-review-to-address-climate-change-for-the-first-time>

Pentagon to rank global warming as destabilising force

<http://www.guardian.co.uk/world/2010/jan/31/pentagon-ranks-global-warming-destabilising-force>

US Department of Defense looks for green innovation

<http://www.businessgreen.com/business-green/news/2257326/departement-defense-looks-green>

² UNEP Year Book 2010 Addresses 'warfare ecology'

Military Implications:

Considering the authoritative nature of the UNEP Year Book series, it is fair to speculate that some of its recommendations, including 'warfare ecology', will find their way into further discourses and international forums.

Source:

UNEP Year Book 2010. New Science and Developments in Our Changing Environment

<http://www.unep.org/yearbook/2010/>

³ UN Panel Meeting on World Water Day to Discuss How to Avoid Water Wars

Military Implications:

The military should liaise with these efforts, as possible, to contribute experience and add water-related information to its early warning information and analysis.

Sources:

Sustainable Management of Water Resources

<http://www.un.org/News/Press/docs//2010/ga10925.doc.htm>

World Water Day Website:

<http://www.unwater.org>

Time to Cure Global Tide of Sick Water

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=617&ArticleID=6504&l=en>

4 Including Security Implications of Climate Change on the Copenhagen Agenda

Military Implications:

Relevant military personnel should consider participation in the conference.

Source:

Climate Change & Security at Copenhagen - II: - New Thinking on the Atlantic Contribution to Success, 7-8 October 2009 – Brussels

<http://www.envirosecurity.org/events/>

5 G8 and G20 Integrate Security and Environmental Issues in Development

Military Implications:

The meetings reinforced the need for international cooperation and integration of global strategies for security, development, and the environment. The military should build on the results of the G8 and G20 meetings to further its international cooperation on environmental sustainability and security, and promote the Army Strategy for the Environment.

Sources:

G8 Muskoka Declaration Recovery and New Beginnings

<http://g8.gc.ca/g8-summit/summit-documents/g8-muskoka-declaration-recovery-and-new-beginnings/>

G-20 Summit website

<http://g20.gc.ca/toronto-summit>

The Toronto Declaration

http://www.g20.org/Documents/g20_declaration_en.pdf

G20 summit drops clean-energy pledge

<http://www.earthtimes.org/articles/news/331848,summit-drops-clean-energy-pledge.html>

6 Environmental Courts and Tribunals Are Rapidly Increasing Around the World

Military Implications:

The military may require additional environmental legal staff to monitor implications for military actions and increased training for those responsible for anticipating and responding to environmental regulations.

Sources:

Environmental Courts Becoming More Popular Worldwide, but Steps Needed for Improvement

<http://www.wri.org/press/2010/04/news-release-environmental-courts-becoming-more-popular-worldwide-steps-needed-improve>

Creating and Improving Environmental Courts and Tribunals

<http://www.accessinitiative.org/resource/greening-justice>

⁷ **International Lawsuits for Environmental Crime Proliferate**

Military Implications:

These activities increase the future likelihood of lawsuits against the military for its environmental footprint and GHG emissions, leading to financial damage claims regarding climate change. The military should identify all its resources and programs for reducing GHGs and how to improve them. Where possible, principles embodied in the Army Strategy for the Environment should be applied and cited.

Sources:

Morales Calls Alternative Climate Meeting

<http://www.cbsnews.com/stories/2010/01/06/tech/main6063924.shtml?tag=contentMain;contentBody>

Courts as Battlefields in Climate Fights

<http://www.nytimes.com/2010/01/27/business/energy-environment/27lawsuits.html>

Pacific islanders bid to stop Czech coal plant

<http://www.reuters.com/article/idUSTRE60B36U20100112>

Czechs Cede To Micronesia Demands Seeking Power Plant Review

<http://www.foxbusiness.com/story/markets/commodities/czechs-cede-micronesia-demands-seeking-power-plant-review/>

Shell must face Friends of the Earth Nigeria claim in Netherlands

<http://www.guardian.co.uk/business/2009/dec/30/shell-oruma-alleged-pollution-claim>

Dutch Court To Take On Shell Nigeria Cases

<http://planetark.org/wen/56156>

Shell headed to Dutch court over Nigerian spills

<http://www.chron.com/disp/story.mpl/business/energy/6793372.html>

Group tasks Shell on welfare of oil spill victims

http://www.ngrguardiannews.com/business/article03/indexn2_html?pdate=221209&ptitle=Group%20tasks%20Shell%20on%20welfare%20of%20oil%20spill%20victims

⁸ **New Approach to Environmental Crime**

Military Implications:

Military personnel who might be called upon to work with other countries in countering environmental crimes should review this report. Under this proposed new paradigm, current activities which damage the environment but are not illegal under international law can be made criminal and be dealt with in order to stave off ecological disasters. They also should keep in mind that these actions might be used as tools in military conflicts.

Sources:

Eco-Crime and Justice: Essays on Environmental Crime, edited by Kristiina Kangaspunta and Ineke Haen Marshall, UNICRI

http://www.freedomfromfearmagazine.org/index.php?option=com_content&view=article&id=243:eco-crime-and-justice-essays-on-environmental-crime&catid=46:frontpage-books&Itemid=180

⁹ OSCE is Enhancing Environmental Security in Central Asia*Military Implications:*

Relevant military personnel with environmental security responsibilities in the region should contact the government of Turkmenistan and OSCE to explore any new developments from these meetings, and their implications for military-to-military cooperation in the region.

Sources:

OSCE Chairperson welcomes Turkmenistan's role in promoting stability in Central Asia

http://www.osce.org/cio/item_1_44791.html

Turkmenistan Weekly Roundup

<http://www.eurasianet.org/node/61437>

¹⁰ East Africa to Increase Environmental Security*Military Implications:*

If not already in process, AFRICOM and other relevant military sections should engage and seek collaboration with EAC and offer assistance with the Implementation Plan for the EAC Regional Strategy for Peace and Security. This is also an opportunity to apply the Army Strategy for the Environment.

Sources:

EAC Peace and Security Conference. Conference Resolutions and Recommendations

<http://www.eac.int/component/content/315.html?task=view>

Regional MPs Advocate for Climatic Change Mitigation

<http://allafrica.com/stories/200910160024.html>

Annual Regional Parliamentary Forum on Environmental Security in Eastern Africa 13 and 14 October 2009

http://www.amaniforum.org/images/09_updates/Update%20on%20Environemtnal%20Security%20Forum.pdf

¹¹ Environmental Security Listed First in UNDP's 2009 Arab Human Development Report*Military Implications:*

The report should be considered as further input in designing peace strategies for the Middle East. Military stationed in the region should increase cooperation with environmental and other organization to address security and its undermining factors simultaneously.

Sources:

Arab Human Development Report 2009

<http://www.arab-hdr.org/contents/index.aspx?rid=5>

Arguing for "Human Security". Arab Human Development Report – 2009

<http://www.saudi-us-relations.org/articles/2009/ioi/090721-human-security.html>

¹² Gimcheon, South Korea to Create a Global Climate Change Situation Room*Military Implications:*

Military personnel monitoring climate change, and developing policy-relevant information for mitigation and adaptation should consider how they might participate in the creation of such a climate change situation room and contact the project manager at <jglenn@igc.org> to determine appropriate modes of participation. Liaison with the Climate Change Situation Room in Gimcheon might also provide new opportunities to help implement the Army Strategy for the Environment.

Sources:

Climate Change Situation Room opening ceremony in Gimcheon, South Korea

<http://www.millennium-project.org/millennium/Korea-CCSR.html>

Global Energy Network and Information System (GENIS)

<http://millennium-project.org/millennium/GENIS.pdf>

INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS

¹⁴ The Convention on Cluster Munitions Enters into Force on August 1, 2010

Military Implications:

Although the U.S. has yet to support the Cluster Munitions Convention, the military should consider strategies for the elimination of cluster bombs, since many NATO countries are party to the Convention. Also, the Oslo process of negotiating international regulations outside the conventional political arena might be emulated for other controversial areas, such as environmental issues.

Sources:

Cluster bomb ban treaty reaches 30th ratification milestone

<http://www.stopclustermunitions.org/news/?id=2040>

The Convention on Cluster Munitions

<http://www.clusterconvention.org/>

¹⁵ Assessment and Potential Revision of Resolution 1540 on Preventing WMD Terrorism

Military Implications:

Considering the fast and complex development of WMD threats, and the lack of coordination and insufficient enforcement of the respective treaties (chemical, biological, and nuclear), it is likely that Resolution 1540 will evolve into a convention, with clear implementation, evaluation and enforcement stipulations. Relevant military personnel should collaborate as appropriate to strengthen and improve the implementation of the Resolution worldwide.

Source:

Risks to Non-proliferation Regime Challenge Resolution 1540 to Ensure States Enact Domestic Controls over Weapons of Mass Destruction Spread to Non-State Actors

<http://www.un.org/News/Press/docs//2009/sc9757.doc.htm>

¹⁶ UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty

Military Implications:

The military should stay abreast of these developments as they relate to planning and materiel. It should also assess all the opportunities to facilitate the NPT negotiations and international cooperation to improve nuclear safety, as well as recommend policy, training, and institutional or physical changes to implement the resolution.

Sources:

U.N. Security Council Approves Nuclear Resolution

http://gsn.nti.org/gsn/nw_20090924_4766.php

Fact Sheet on the United Nations Security Council Summit on Nuclear Nonproliferation and Nuclear Disarmament UNSC Resolution 1887

http://www.whitehouse.gov/the_press_office/Fact-Sheet-on-the-United-Nations-Security-Council-Summit-on-Nuclear-Nonproliferation-and-Nuclear-Disarmament-UNSC-Resolution-1887/

¹⁷ Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties

Military Implications:

The Pelindaba Treaty, also covering nearby territories around the continent, triggers controversies around the island of Diego Garcia, which has a strategic role for the UK and U.S. military. Reportedly, there are calls on the Mauritius government to declare Diego Garcia “nuclear-weapon-free” in order to meet its treaty obligations. The way this issue will unfold will create a precedent for similar cases around the world. Military stationed in the Southern Hemisphere should be prepared to comply with an eventually total nuclear-free zone.

Sources:

Africa Renounces Nukes. Treaty's Entry into Force Makes Entire Southern Hemisphere Free of Nuclear Weapons

<http://www.iaea.org/NewsCenter/News/2009/africarenonces.html>

African Nuclear-Weapon-Free Zone in Force: What Next for Diego Garcia?

<http://www.asil.org/files/insight090827pdf.pdf>

¹⁸ Belgian Senate to Consider Nuclear-Weapon Ban

Military Implications:

This is one more indicator of the growing interest in banning nuclear weapons and the long-range need for new forms of deterrence.

Sources:

Belgian Senate to Consider Nuclear-Weapon Ban

http://gsn.nti.org/gsn/nw_20091016_3998.php

Bill to ban nuclear weapons reaches Belgian Senate

http://www.breitbart.com/article.php?id=D9BBIE780&show_article=1

Belgian initiative to ban nuclear weapons

<http://groups.yahoo.com/group/NucNews/message/30249>

¹⁹ Changes to War Crimes Proposed for the International Criminal Court

Military Implications:

It is likely that all proposals will be considered during the 2010 Review Conference on the Rome Statute. Although the U.S. is not a State Party to the ICC, it should be prepared to comply with any new amendments in those countries that are States Party.

Sources:

Report of the Bureau on the Review Conference; Addendum. ICC-ASP/8/43/Add.1, 10 Nov., 2009
http://www.icc-cpi.int/iccdocs/asp_docs/ASP8/ICC-ASP-8-43-Add.1-ENG.pdf

Report of the Bureau on the Review Conference. ICC-ASP/8/43, 15 November 2009
http://www.icc-cpi.int/iccdocs/asp_docs/ASP8/ICC-ASP-8-43-ENG.pdf

Proposal of Belgium on amendments to Article 8 of the Rome Statute
<http://www.iccnw.org/?mod=belgianproposal>

ICC Eighth session

http://www.icc-cpi.int/Menus/ASP/Sessions/General+Debate/GENERAL+DEBATE+_+Eighth+Session+of+the+Assembly+of+States+Parties.htm

Intervention of Belgium at the 8th Session of the Assembly of States Parties to the International Criminal Court

http://www.icc-cpi.int/iccdocs/asp_docs/ASP8/Statements/ICC-ASP-ASP8-GenDeba-Belgium-FRE.pdf (in French)

Chemical, biological weapons use should be war crime, Dutch say

<http://www.earthtimes.org/articles/show/293595,chemical-biological-weapons-use-should-be-war-crime-dutch-say.html>

²⁰ **Increased Calls for Banning Nonlethal Riot-control Agents**

Military Implications:

Given the authoritative standard of the report, it is likely that it will find its way onto the policymaking agenda, thereby influencing changes to the CWC. The military and its contractors should be prepared to comply with eventual new restrictions in the States Party to the CWC. Also, until the relevant policy steps are taken, the military should continue exploring how potentially dangerous are the chemical agents and non-lethal weapons used by military and private security companies, in order to discover and eliminate harmful items and practices.

Sources:

Danger of "Nonlethal" Agents Grows Amid States' Inaction, Report Says
http://gsn.nti.org/gsn/nw_20091106_8443.php

Dangerous Ambiguities: Regulation of Riot Control Agents and Incapacitants under the Chemical Weapons Convention. Michael Crowley, 2009
<http://www.brad.ac.uk/acad/nlw/publications/BNLWRPDangerous1.pdf>

²¹ **UN Mission Assessment of Gaza Conflict Included Environmental Impacts**

Military Implications:

These UNEP and UN Mission assessments show increased international concerns over post-conflict liability and redress, mounting pressure for adopting regulations based on the "polluter pays" principle, mainly concerning environmental damages in war, as well as for increased

precision in attacks, to decrease environmental impact. Additionally, recommendations could lead to bans on some weapons and materials such as white phosphorous and/or DIME.

Sources:

Human Rights in Palestine and other Occupied Arab Territories. Report of the United Nations Fact Finding Mission on the Gaza Conflict (Advance Edited Version; A/HRC/12/48)

http://www2.ohchr.org/english/bodies/hrcouncil/specialsession/9/docs/UNFFMGC_Report.pdf

UN Fact Finding Mission finds strong evidence of war crimes and crimes against humanity committed during the Gaza conflict; calls for end to impunity

<http://www.unhcr.ch/hurricane/hurricane.nsf/view01/9B63490FFCBE44E5C1257632004EA67B?opendocument>

²² **New Legal Proceeding over Allegations of Use of Illegal Weapons in Iraq**

Military Implications:

Although these types of legal actions against U.S. military are difficult (to impossible) since the U.S. is not Party of the International Criminal Court, they would affect its allied forces, States Party to the ICC.

Source:

Army to be sued for war crimes over its role in Fallujah attacks

<http://www.independent.co.uk/news/world/asia/army-to-be-sued-for-war-crimes-over-its-role-in-fallujah-attacks-1961475.html>

²³ ***Protecting the environment during armed conflict. An inventory and analysis of international law***

Military Implications:

This report should be studied by those military personnel with operational planning and environmental responsibilities during and in post-conflict conditions, since it is reasonable to speculate that the report's recommendations will be considered for further shaping international regulations concerning protection of the environment in armed conflicts.

Sources:

Laws Protecting the Environment during Wars Need Enforcing and Strengthening to Deal with New Challenges

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=602&ArticleID=6362&l=en>

Protecting the environment during armed conflict. An inventory and analysis of international law
http://postconflict.unep.ch/publications/int_law.pdf

²⁴ **First U.S. National Health Security Plan Released**

Military Implications:

Relevant military personnel should study the report to assist in implementation of the new strategy.

Sources:

First U.S. National Health Security Plan Released

http://gsn.nti.org/gsn/nw_20100108_9470.php

HHS Delivers the Nation's First Health Security Strategy

<http://www.hhs.gov/news/press/2010pres/01/20100107a.html>

²⁵ **Jordan Armed Forces Upgrade, Part of Global Warming Debate**

Military Implications:

The Army Strategy on the Environment and related documents should be shared with the US military liaison in Jordan to explore applications and share military efforts to reduce the military "footprint." Jordan might set a precedent for holding the sector accountable the same way transportation and different industries are; even more so, since climate change impacts may exacerbate conflicts. [Note: the AEPI website lists several reports that deal with environmental considerations related to military functions and operations.]

Sources:

Jordan enlists army in climate fight

<http://www.reuters.com/article/idUSLDE61H0TH20100219?type=marketsNews>

²⁶ **Iran and Qatar Sign Environmental MOU**

Military Implications:

The Army Strategy for the Environment and related documents should be shared with the US military liaison in Qatar to explore applications and share US military experience to reduce the military "footprint." Qatar might set a precedent for holding the sector accountable the same way transportation and different industries are, or even more so, since climate change impacts may exacerbate conflicts. [Note: the AEPI website lists several reports that deal with environmental considerations related to military functions and operations.]

Source:

Iran and Qatar Align to Help the Environment

<http://www.greenprophet.com/2010/02/28/17972/qatar-iran-environment>

²⁷ **Morocco Adopts First National Earth Charter in the Arab World and Africa**

Military Implications:

AFRICOM and military units stationed in Africa and the Arab World should encourage emulation of Morocco's example as part of promoting conflict resolution policies.

Sources:

Morocco's National Earth Charter a First for the Arab World

<http://www.ens-newswire.com/ens/apr2010/2010-04-22-01.html>

Morocco Announces National Earth Charter for 40th Anniversary of Earth Day

<http://earthday.net/blog/2010/03/19/morocco-announces-national-earth-charter-for-40th-anniversary-of-earth-day/>

²⁸ Russia to Boost Its Space Security Program*Military Implications:*

[Similar to previous on this issue] In addition to the DOD's Commercial and Foreign Entities program, the military should increase cooperation with military counterparts and civilian organizations around the world to explore joint research programs and design of a legal framework to increase space security.

Sources:

Russia Needs To Add Asteroid Hazard Study To National Space Program – Opinion (ITAR-TASS, Moscow, October 6; article available afor a limited time)

International conference Asteroid-Comet Hazard – 2009

http://www.ipa.nw.ru/conference/ach2009/first_announcement.php?lang=en

Russia develops design for spaceship with nuclear engine

<http://en.rian.ru/science/20091028/156623290.html>

Asteroid Apophis less likely to collide with Earth

<http://www.itwire.com/content/view/28361/1066/>

²⁹ UN Economic Commission for Europe Adopts Electric and Hybrid Vehicle Regulations*Military Implications:*

It would be wise to review these new UNECE regulations for their potential incorporation into the technical standards for vehicles around the world. For their own benefit, military organizations and personnel stationed in Europe and countries adopting the new UNECE regulations should ensure that their vehicles comply with the respective or tougher safety standards.

Source:

Car safety: European Commission welcomes international agreement on electric and hybrid cars

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/260&format=HTML&aged=0&language=EN&guiLanguage=en>

³⁰ Spain Promotes European Common Strategy on Electric Cars*Military Implications:*

The military should follow the development of a European common strategy and eventual standards for electric cars and be prepared to comply with them for its own vehicles stationed in Europe. Also, the EU example might be emulated and applied by other regions around the world.

Source:

Spain pushes for common strategy on electric cars

<http://euobserver.com/880/29443>

³¹ China to Create an Emergency Environmental Management System*Military Implications:*

[Similar to previous on this issue] The environment should be a key focus of military-to-military relations with China. Its growing environmental problems could cause a variety of socio-economic instability conditions nationally and internationally. Relevant military personnel should consider applications of the Army Strategy for the Environment to increase cooperation with Chinese counterparts.

Source:

China to establish emergency environmental management system

http://news.xinhuanet.com/english/2009-12/29/content_12725490.htm

Chinese See Environment As Biggest Security Threat

<http://blog.newsweek.com/blogs/wealthofnations/archive/2009/12/10/chinese-see-environment-as-biggest-security-threat.aspx>

³² **Tuvalu to use only renewable energy by 2020**

Military Implications:

The military should monitor these small island countries' strategies and results for eventual implementation in other small developing countries that are struggling with energy security and pollution as well as for lessons learned that might reveal techniques applicable to permanent and battlefield military installations.

Source:

At risk from rising seas, Tuvalu seeks clean power

<http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE5611EO20090719>

³³ **Thailand, Other Asian Countries, May Tighten Environmental Regulations**

Military Implications:

Although current actions concern industrial development, the military and its contractors in East and Southeast Asia should be aware of this case as an example of the growing influence of the environmental movement in the region and be informed of the Army Strategy for the Environment, as a vehicle for exploring better environmental relations in the region.

Source:

Thailand Tightens Environmental Regulation

<http://online.wsj.com/article/SB10001424052748704182004575056421383885014.html>

TECHNOLOGICAL BREAKTHROUGHS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

³⁵ **Network of Autonomous Robots Monitors Difficult Environments**

Military implications:

The military might consider investigating this technology for application in surveillance of hostile or difficult environments.

Source:

'Spiderbots' talk amongst themselves inside active volcano

<http://www.jpl.nasa.gov/news/news.cfm?release=2009-117>

New Detection and Cleanup Techniques

³⁷ Assessment of Fine Dust Composition Method

Military Implications:

The military should investigate this technique for use in environmental assessment. It is of special significance considering Item 5.7.3 New Paper Suggests Concentrating Toxicity Studies on Smaller Nanoparticles from the September 2009 issue of this report.

Source:

Tracing ultra-fine dust

<http://www.nanowerk.com/news/newsid=12864.php#>

³⁸ Microcantilevers Provide Ultrasensitive Detection

Military Implications:

The military should follow this development for its possible application to detection of chemical hazards in the environment.

Source:

Novel sensor exploits traditional weakness of nano-devices

http://www.nanowerk.com/news/newsid=14813.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁹ New Color Matrix Sensor Array Warns of Toxic Gases

Military Implications:

The military should follow this development for its applicability to fast, accurate environmental scanning.

Sources:

Postage stamp-sized electronic nose sniffs out poisonous gases

<http://www.nanowerk.com/news/newsid=12593.php>

An optoelectronic nose for the detection of toxic gases

<http://www.nature.com/nchem/journal/vaop/ncurrent/abs/nchem.360.html>

⁴⁰ Silicon-on-insulator Microring Resonator Provides High Sensitivity Gas Detection

Military Implications:

The military should follow this development for its applicability to high performance environment sensing systems.

Source:

Optical ethanol vapor sensor shows potential of SOI-based integrated gas sensors

<http://www.nanowerk.com/news/newsid=16809.php>

41 New Material Will Aid Radioactive Cleanup

Military Implications:

The military should investigate this development for its possible use in environmental remediation.

Sources:

Snag radioactive waste like a Venus flytrap

<http://futura.org/science-technology/snag-radioactive-waste-like-a-venus-flytrap/>

Selective incarceration of caesium ions by Venus flytrap action of a flexible framework sulfide

<http://www.nature.com/nchem/journal/vaop/ncurrent/abs/nchem.519.html>

42 Genetically Engineered Bacteria Might Provide Landmine Detection

Military Implications:

This approach has not yet been tested outside the laboratory, and the use of E. coli bacteria, especially genetically modified, raises obvious questions, but the military should keep in touch with this work in case it results in a practical environment-sensing technique.

Source:

Bacteria make light work of detecting landmines

<http://www.scidev.net/en/news/bacteria-make-light-work-of-detecting-landmines.html>

43 Chemical Vapor Deposition Creates Nano Filters, Catalyst Scaffolds

Military Implications:

The military should follow this technique for its application in systems for environmental cleanup

Sources:

Scientists build better catalyst with nanotube membranes

<http://www.nanowerk.com/news/newsid=15986.php>

Three-Dimensional Carbon Nanotube Scaffolds as Particulate Filters and Catalyst Support Membranes

<http://pubs.acs.org/doi/abs/10.1021/nm100150x>

44 Review and Map of Use of Nanomaterials for Environmental Cleanup

Military Implications:

Military personnel concerned with both nanotech risk assessment and environmental cleanup applications should consider the map for improving safe environmental use of nanotech.

Sources:

Contaminated Site Remediation: Are Nanomaterials the Answer? First Map of Global Nanoremediation Sites Available Online

<http://www.nanotechproject.org/news/archive/8267/>

Nanotechnology and In situ Remediation: A Review of the Benefits and Potential Risks

<http://www.ehponline.org/docs/2009/0900793/abstract.html>

Nanoremediation Map

http://www.nanotechproject.org/inventories/remediation_map/

⁴⁵ **Nanotechnology Applications for Clean Water**

Military Implications:

The book might represent a good source of information on nanotech developments for producing clean water.

Sources:

Nanotechnology Applications for Clean Water

http://www.elsevier.com/wps/find/bookdescription.cws_home/715798/description

Book Review of Nanotechnology Applications for Clean Water

<http://www.nanolabweb.com/index.cfm/action/main.default.viewArticle/articleID/294/CFID/3843948/CFTOKEN/94277499/index.html>

⁴⁶ **Nanotube-impregnated Paper Provides Sensitive Biosensor for Aqueous Toxins**

Military Implications:

The military should investigate the applications of these devices to assessment of environmental hazards in water.

Sources:

Simple nanotechnology paper sensor for detecting toxins in water

http://www.nanowerk.com/spotlight/spotid=13913.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+New%29

Simple, Rapid, Sensitive, and Versatile SWNT–Paper Sensor for Environmental Toxin Detection Competitive with ELISA

<http://pubs.acs.org/doi/abs/10.1021/nl902368r>

⁴⁷ **Genetically Engineered Tobacco Plant May Clear Polluted Water**

Military Implications:

The military should follow this development, as it may proceed toward a practical system for aiding in the decontamination of polluted environments.

Sources:

Genetically engineered tobacco plant cleans up environmental toxin

<http://www.physorg.com/news186660152.html>

Generation of transgenic plants expressing antibodies to the environmental pollutant microcystin-LR

<http://www.fasebj.org/cgi/content/abstract/24/3/882?maxtoshow=&hits=10&RESULTFORMAT=&fulltext=tobacco&searchid=1&FIRSTINDEX=0&volume=24&issue=3&resourcetype=HWCIT>

48 Water decontamination improved with gallium*Military Implications:*

The military should investigate the commercial version of this improved compound for use in water purification in contaminated environments, especially in harsh and remote environments. Were this technique to prove safe for routine human consumption, then new demands for gallium could result in higher prices for gallium used in electronic components.

Sources:

Purer water made possible by Sandia advance

<http://www.sandia.gov/news/resources/releases/2009/waterpurity.html>

Enhanced Water Purification: A Single Atom Makes a Difference

<http://pubs.acs.org/doi/abs/10.1021/es803683t>

49 New Ultra-sensitive Detector for Water-borne Hazards*Military Implications:*

The military should follow this technique as it evolves for environmental testing of water for significant contaminants.

Sources:

Cheap, sensitive carbon nanotube sensors could detect explosives, toxins in water

<http://www.nanowerk.com/news/newsid=12779.php>

Sorted and Aligned Single-Walled Carbon Nanotube Networks for Transistor-Based Aqueous Chemical Sensors

<http://pubs.acs.org/doi/abs/10.1021/nn900808b>

50 New Water Purifying Filter Requires No Energy or Running Water*Military Implications:*

The military should investigate this unit as a possible water source in difficult environments.

Source:

Tata Chemicals launches 'Tata Swach'

<http://www.tata.com/media/releases/inside.aspx?artid=TtOdcdNuSRk=>

51 Ozone Bubbles Provide New Cleansing Technique*Military Implications:*

The military should investigate this technique as a possible tool for environmental cleanup.

Source:

Tiny Bubbles Clean Oil from Water. New Method Targets Oil Sheen, Other Pollutants

<http://unews.utah.edu/p/?r=111209-1>

52 New Catalyst Removes Nitrite and Nitrate from Drinking Water*Military Implications:*

The military should evaluate this technique for its usefulness in cleanup of contaminated water supplies.

Source:

University of Twente Develops Catalysts For Clean Drinking Water

<http://www.utwente.nl/news/ut-ontwikkelt-katalysatoren-voor-schoon-drinkwater>

⁵³ New Nature-based Filter Allows Utilization of Gray Water

Military Implications:

Although the use of gray water is generally forbidden in the US, the military should consider this technique as a possible source of supplementary water for appropriate purposes in less developed arid operational regions.

Source:

Love that dirty water: Scientists find low-tech way to recycle H₂O

<http://www.physorg.com/news193945696.html>

⁵⁴ Water Treatment Technologies for the Removal of High-Toxicity Pollutants

Military Implications:

Relevant military personnel should consider the book as a resource for addressing water pollution causes and treatment solutions.

Source:

Water Treatment Technologies for the Removal of High-Toxicity Pollutants.

http://www.springerlink.com/content/978-90-481-3495-3?sa_campaign=email/NBA

⁵⁵ New Technique Helps Reduce Nanoparticle Wastewater Pollution

Military Implications:

Military personnel concerned with nanotech risk management should investigate this technology for utility in planning and conducting mitigation operations.

Source:

Centre for Ecology & Hydrology

New discovery may help manage nanoparticle wastes from consumer products

<http://www.ceh.ac.uk/news/press/ManagenanoparticlEWastesfromconsumerproducts.asp>

⁵⁶ Project Developing Sensors for Engineered Nanoparticles

Military Implications:

The military should keep in touch with this research, in order to learn of techniques and new findings in the field of nanoparticle/environment interaction.

Source:

Chemist monitors nanotechnology's environmental impact

<http://www.nanowerk.com/news/newsid=15415.php>

⁵⁷ Variable Heating Provides New Flexibility for Gas Sensors

Military Implications:

The military should explore this new methodology for its usefulness in systems for detecting and identifying environmental contaminants and battlefield chemical signals of enemy and friendly action.

Source:

Sniffing Out a Better Chemical Sensor

http://www.nist.gov/public_affairs/techbeat/tb2008_1028.htm#nose

⁵⁸ Dirty Bomb Treatment Technology Developed in U.K.

Military Implications:

The military should explore the new UK device as a component for evaluating health damage to victims of acute radiation exposure and to facilitate collaboration with “first responders.”

Sources:

'Dirty bomb' breakthrough

<http://www.independent.co.uk/news/science/dirty-bomb-breakthrough-1786616.html>

⁵⁹ Paper biosensors to detect toxins, pathogens, and viruses

Military Implications:

The military should consider this development for potential fast and easy environmental surveillance.

Sources:

System created to make paper biosensors

http://www.upi.com/Science_News/2009/07/15/System-created-to-make-paper-biosensors/UPI-86031247691146/

Printing toxin-detecting paper

<http://dailynews.mcmaster.ca/story.cfm?id=6280>

⁶⁰ Work Proceeds on Optical Fiber Detector for Bacterial Agents

Military Implications:

The military should follow this work as it continues toward development of fast, reliable sensor systems for identifying environmental hazards.

Source:

Nanoscale optical fibers to detect bioterrorist agents:

<http://www.nanowerk.com/news/newsid=14320.php>

⁶¹ New Polymer Fights Both Biological and Chemical Toxins

Military Implications:

The military should follow this development in its progress toward commercial availability as an environmental cleanup technology.

Source:

Multifunctional polymer neutralizes both biological and chemical weapons

http://www.eurekalert.org/pub_releases/2010-03/uops-mpn031810.php

⁶² Scanning Instrument for Chemical Agents Detection

Military implications:

Relevant military personnel might consider the new scanning technology for potential application in detecting harmful chemicals.

Sources:

Chemical sensor to fight terrorism

http://latestnews.virginmedia.com/news/tech/2009/10/05/chemical_sensor_to_fight_terrorism

Ulster scientists develop sensors for chemical agents

<http://kn.theiet.org/news/sep09/ulster-chem-sensors.cfm>

⁶³ Ultrasensitive Sensor Could Detect Bacteria in Minutes

Military Implications:

The military should follow these developments as possibly providing components for environmental surveillance and evaluation systems.

Source:

Ultrafast DNA Nanosensor. A new type of sensor makes diagnosing infections quick and easy

<http://www.technologyreview.com/biomedicine/23575/>

⁶⁴ Neurotoxins Detected/Neutralized by New Fast Molecular Configuration

Military Implications:

The military should follow this development as it progresses toward use in a practical integrated system for detecting and destroying organophosphate toxins.

Sources:

Hydroxy Oximes as Organophosphorus Nerve Agent Sensors

<http://www3.interscience.wiley.com/journal/122597479/abstract?> (abstract)

Ring closure as warning - new, extremely fast detection of neurotoxins

<http://www.nanowerk.com/news/newsid=12678.php>

⁶⁵ New Laser-based Gas Sensor Is Tunable over Wide Wavelength Range

Military Implications:

The military should follow this development as it moves toward practical usage in environmental sensing systems.

Sources:

NEMIS (New Mid-Infrared Sources for Photonic Sensors)

<http://www.nemis.eu/>

Huge long-term potential for new breed of gas sensors

<http://www.nanowerk.com/news/newsid=13823.php>

Promising Environmental-friendly Technologies

67 Improved Techniques for Water Desalination

Military Implications:

The military should follow these developments to see if they progress toward practical systems for water-scarce environments.

Sources:

Salt Rejection and Water Transport Through Boron Nitride Nanotubes

<http://dx.doi.org/10.1002/sml.200900349>

Using microbes and wastewater to desalinate water

<http://pubs.acs.org/doi/full/10.1021/es902384g?prevSearch=logan%2Bbacteria%2Bdesalination&searchHistoryKey=>

Nanotubes help to solve desalination problem

<http://news.anu.edu.au/?p=1558>

68 Evaporation Provides Power in New Desalination System

Military Implications:

The military should investigate this technology for its usefulness as a low energy way of producing fresh water in hot, arid environments.

Sources:

Saltworks Technologies Company

<http://www.saltworkstech.com>

Breakthrough in Energy Efficient Desalination Technology

http://www.globe-net.com/green_tech/listing.cfm?ID_Report=1856

A fresh way to take the salt out of seawater

http://www.economist.com/sciencetechnology/displaystory.cfm?story_id=14743791

69 New Membranes Claim to Cut Desalination Energy Requirements

Military Implications:

The military should investigate and follow these developments, as they appear to offer desalination system energy-efficiency improvements.

Source:

NanoH₂O to Change the Economics of Desalination

<http://www.greentechmedia.com/articles/print/nanoh2o/>

70 Desalination Reverse Osmosis Improved by Ion Concentration Polarization

Military Implications:

The military should follow this development for future use in providing small, low-power desalination capability.

Sources:

A system that's worth its salt: New approach to water desalination could lead to small, portable units

<http://www.physorg.com/news188399888.html>

Direct seawater desalination by ion concentration polarization

<http://www.nature.com/nnano/journal/vaop/ncurrent/abs/nnano.2010.34.html>

⁷¹ A New Water Management Tool

Military implications:

The tool might be useful to military personnel with environmental responsibilities and water resource management to monitor and regulate water consumption (mostly in arid and semi-arid regions where water supply might not be sufficient for all uses.)

Sources:

Washington Post: Water Measured From the Sky

<http://www.washingtonpost.com/wp-dyn/content/article/2009/09/13/AR2009091302368.html>

The Idaho Department of Water Resources

<http://www.idwr.idaho.gov/>

⁷² Plastic Waste Yields Porous Paving for Walks and Drives

Military Implications:

The military should investigate this product, when it becomes commercially available, for possible use in military recycling and construction programs.

Source:

Cement-like creation could help the environment

<http://www.physorg.com/news190999420.html>

⁷³ Progress Announced in Methane-to-Liquid Process Development

Military Implications:

Although this is only the beginning of a long development effort, the military should stay in touch with this approach to an alternative fuel source.

Sources:

New clues in quest for liquid methane

<http://futura.org/top-stories/new-clues-in-quest-for-liquid-methane/>

Characterization of a Rhodium(I) {sigma}-Methane Complex in Solution

<http://www.sciencemag.org/cgi/content/abstract/sci;326/5952/553>

⁷⁴ New Tool for Reducing Carbon Emissions from Building Construction Projects

Military Implications:

The military should investigate the applicability of this tool to military construction and retrofitting projects.

Source:

Green Footstep

<http://greenfootstep.org>

⁷⁵ Grease-repelling Surface Coating Reduces Need for Detergents

Military Implications:

The military should follow this technology for its promise of reducing the environmental impact of surface cleaning.

Source:

Scientists Develop Self-Cleaning Material

<http://www.azonano.com/news.asp?newsID=13153>

⁷⁶ New Liquid Spray Glass Offers Rugged Surface Protection

Military Implications:

The military should investigate this product, which allegedly is both environmentally friendly itself, and offers excellent protection to materials against environmental hazards.

Sources:

Spray-on liquid glass is about to revolutionize almost everything

<http://www.physorg.com/news184310039.html>

Liquid Glass is probably the world's most versatile new technology?

<http://www.nanopool.eu/couk/index.htm>

⁷⁷ Nanoporous Alumina Membranes Useful for EHS Applications

Military Implications:

The military should follow up on the possible use of this technology for environmental remediation and preventive health functions.

Sources:

Incorporating biofunctionality into nanomaterials for medical, health devices

<http://www.nanowerk.com/news/newsid=15441.php>

Atomic layer deposition-based functionalization of materials for medical and environmental health applications

<http://rsta.royalsocietypublishing.org/content/368/1917/2033>

⁷⁸ Review of US National Nanotechnology Initiative

Military Implications:

Military personnel concerned with nanotech should consider watching the discussion.

Sources:

President's Council of Advisors on Science and Technology, March 12, 2010 meeting

<http://www.whitehouse.gov/administration/eop/ostp/pcast>

webcast: <http://www.tvworldwide.com/events/pcast/100312/>

Increasing Energy Efficiency Technologies

⁸⁰ ‘Energy Harvesting’ Offers Possibilities for Environment-sparing Power

Military Implications:

The military should follow this research for its possible applicability to replacing batteries in systems with very low power requirements.

Source:

Pickin' Up Good Vibrations to Produce Green Electricity

<http://www.epsrc.ac.uk/PressReleases/harvester>

⁸¹ Solar-chargeable Lamp Provides Low-Cost Illumination

Military Implications:

The military should consider this technology as a way of providing low-cost illumination.

Sources:

Low-cost solar solution could empower off-grid poor

<http://www.scidev.net/en/news/low-cost-solar-solution-could-empower-off-grid-poor.html>

Manufacture, integration and demonstration of polymer solar cells in a lamp for the Lighting Africa initiative

<http://www.rsc.org/Publishing/Journals/EE/article.asp?doi=b918441d>

⁸² New Wearable Energy Charger Technologies

Military Implications:

The military should investigate these technologies as possible power sources for individual wearable data storage and communication and environmental sensing devices.

Source:

Holst Centre and imec recognized for their path breaking wearable energy harvester technology

http://www.nanowerk.com/news/newsid=14625.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Recharging Your Cellphone, Mother Nature's Way

<http://www.nytimes.com/2010/01/31/business/31novel.html?partner=rss&emc=rss>

Energy scavenging

<http://www.shapingtomorrow.com/trends.cfm?trendAlert=1> (by free subscription only)

⁸³ Advances in Generating Electricity from the Body

The Parametric Frequency Increased Generators (PFIGs) developed by researchers of the Univ. of Michigan's Engineering Research Center for Wireless Integrated Microsystems are reported to be able to generate 0.5 milliwatts from typical vibrations in the human body. Both piezoelectric and electromagnetic induction types have been tested and are claimed to be more efficient than previous devices with vibrations that are non-periodic and occur at low frequencies. [Related item: "Energy Harvesting" Offers Possibilities for Environment-sparing Power in December 2009 environmental security report.]

Military Implications:

The military should follow this research for its possible applicability to replacing batteries in personal systems with very low power requirements.

Source:

Mini generators make energy from random ambient vibrations

<http://www.physorg.com/news188569711.html>

⁸⁴ Highly Conductive Fabrics Promise More Efficient Energy Storage

Military Implications:

The military should follow the applications of this development in providing power sources for data storage and communication and environmental systems.

Sources:

Turning your T-shirt into a battery

http://www.nanowerk.com/news/newsid=14701.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Stretchable, Porous, and Conductive Energy Textiles

<http://pubs.acs.org/doi/abs/10.1021/nl903949m>

⁸⁵ Power-generating Flexible Films Might Power Body-worn Devices

Military Implications:

The military should investigate this technology as a possible way of using body movements to power body-mounted environmental sensing devices or to generate power from other sources, like wind acting on flexible panels or "sails" or recapture of energy lost in vibration of vehicles in motion.

Sources:

Energy-harvesting rubber sheets could power pacemakers, mobile phones

<http://www.physorg.com/news183832835.html>

Piezoelectric Ribbons Printed onto Rubber for Flexible Energy Conversion

<http://pubs.acs.org/doi/abs/10.1021/nl903377u>

86 New Materials May Be Solar Cell Breakthrough*Military Implications:*

The military should follow this development as a contribution to the progress toward more efficient alternative energy generation systems.

Sources:

Researchers solve two 20-year old problems that could transform solar cell technology
http://www.nanowerk.com/news/newsid=15659.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

CoS Supersedes Pt as Efficient Electrocatalyst for Triiodide Reduction in Dye-Sensitized Solar Cells

<http://pubs.acs.org/doi/abs/10.1021/ja905970y>

An organic redox electrolyte to rival triiodide/iodide in dye-sensitized solar cells

<http://www.nature.com/nchem/journal/v2/n5/abs/nchem.610.html>

87 New Structure Almost Doubles Solar Cell Efficiency*Military Implications:*

The military should follow work on this improved design for its applicability to power supplies for field equipment.

Sources:

Silicon nanohole solar cells aim to make photovoltaics cost-competitive

<http://www.physorg.com/news192447083.html>

High-Performance Silicon Nanohole Solar Cells

<http://pubs.acs.org/doi/abs/10.1021/ja910082y>

88 New Selective Radiation Surfaces May Save on Cooling Energy*Military Implications:*

The military should keep in touch with this research, as possibly leading to energy-saving cooling systems for military installations and systems.

Source:

Nanocoating that acts as efficient heat pump could reduce need for energy-guzzling air conditioning

<http://www.nanowerk.com/news/newsid=14466.php>

89 Nano-infused Paper Substrate Improves Energy Storage Capabilities*Military Implications:*

The military should follow this line of research as requirements increase for smaller and lighter electronic devices to be used in operational and environmental systems.

Sources:

Highly conductive paper for energy-storage devices

<http://www.pnas.org/content/early/2009/12/04/0908858106>

At Stanford, nanotubes + ink + paper = instant battery

<http://news.stanford.edu/news/2009/december7/nanotubes-ink-paper-120709.html>

⁹⁰ Nanowire Solar Cells Have Prospect of Higher Efficiency

Military Implications:

The military should follow this development as a possible environment-sparing component for future power supply systems.

Source:

Towards nanowire solar cells with a 65-percent efficiency

http://w3.tue.nl/en/services/daz/alumni/news/news_article/?tx_ttnews%5Btt_news%5D=9746&tx_ttnews%5BbackPid%5D=12152&cHash=8c268b0cfc

⁹¹ Algae Provide Material for New Thin and Flexible Battery

Military Implications:

The military should follow this development for its potential use in very light, portable environmental sensing systems.

Sources:

Super-thin batteries made from paper and algae

<http://www.rsc.org/chemistryworld/News/2009/September/15090902.asp>

Ultrafast All-Polymer Paper-Based Batteries

<http://pubs.acs.org/doi/abs/10.1021/nl901852h>

Salt and Paper Battery May One Day Replace Lithium Batteries

<http://www.physorg.com/news172241467.html>

⁹² Genetically Modified Virus Claimed to Separate Hydrogen from Water

Military Implications:

The military should follow the evolution of this technology as a new possibility for cost-effective hydrogen powered generation.

Sources:

MIT researchers harness viruses to split water

<http://web.mit.edu/press/2010/virus-water.html>

MIT Trains Viruses to Split Water, Make Stored Solar Power

<http://www.dailytech.com/MIT+Trains+Viruses+to+Split+Water+Make+Stored+Solar+Power/article18119.htm>

⁹³ Inexpensive Metal Catalyst for Hydrogen Generation from Water

Military Implications:

The military should follow this work on a potential hydrogen fuel source as efforts continue to improve the process.

Sources:

Berkeley Scientists Discover Inexpensive Metal Catalyst for Generating Hydrogen from Water

<http://newscenter.lbl.gov/news-releases/2010/04/30/inexpensive-catalyst-for-generating-hydrogen-from-water/>

Catalyst Brings Cheap Hydrogen Fuel Closer to Reality

<http://news.sciencemag.org/sciencenow/2010/04/catalyst-brings-cheap-hydrogen-f.html>

A molecular molybdenum-oxo catalyst for generating hydrogen from water

<http://www.nature.com/nature/journal/v464/n7293/full/nature08969.html>

⁹⁴ Fiber Bundles Claimed Safe for Hydrogen Storage and Cuts Costs and Weight

Military Implications:

The military should follow this development on its path toward commercialization, as a useful component of hydrogen vehicles and fuel cell energy systems.

Sources:

Hydrogen still in the eco-car race

<http://www.physorg.com/news190778451.html>

C.En Company

<http://www.cenh2go.com/>

⁹⁵ Fiber-based Solar Cells Decrease Cost and Double Output

Military Implications:

The military should follow the commercialization of this technology for possible use in alternative energy systems.

Sources:

A brighter idea. Wake Forest receives patent for new fiber solar cells

<http://www.wfu.edu/wowf/2010/20100407.solar.php>

Red dye from pokeberries holds secret to affordable solar power

<http://www.nanowerk.com/news/newsid=15962.php>

⁹⁶ New Dye-Sensitized Solar Cells Show Increase in Energy Conversion Efficiency

Military Implications:

The military should investigate this new step forward in renewable energy technology.

Source:

Innovation puts next-generation solar cells on the horizon

http://www.nanowerk.com/news/newsid=13777.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

⁹⁷ Thin Crystalline-Silicon Photovoltaic Cells Offer Many Advantages

Military Implications:

The military should follow this development as a promising component for future alternative energy systems.

Source:

Glitter-sized solar photovoltaics produce competitive results

http://www.sandia.gov/news/resources/news_releases/glitter-sized-solar-photovoltaics-produce-competitive-results/

⁹⁸ **Quantum Dots Offer New Possibilities for Energy from Waste Heat**

Military Implications:

The military should keep in touch with these efforts as they proceed toward commercially available, environment-sparing energy sources.

Sources:

Better way to harness waste heat with quantum dot devices

<http://www.nanowerk.com/news/newsid=13604.php>

Quantum-coupled single-electron thermal to electric conversion scheme

<http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=JAPIAU000106000009094315000001&idtype=cvips&gifs=yes>

⁹⁹ **Carbon Nanotubes Yield Threefold Increase in Thermocell Efficiency**

Military Implications:

The military should follow this development as a possible source of recycling low-cost energy from waste heat from a variety of engines and devices.

Sources:

Nanotube Thermocells Hold Promise as Energy Source

<http://www.physorg.com/news186409698.html>

Harvesting Waste Thermal Energy Using a Carbon-Nanotube-Based Thermo-Electrochemical Cell

<http://www.me.gatech.edu/dest/images/nl903267n.pdf>

¹⁰⁰ **Genetically Engineered Bacteria Convert CO₂ to Liquid Fuel**

Military Implications:

The military should follow this development as a potential environment-friendly source of alternative energy.

Source:

Researchers engineer bacteria to turn carbon dioxide into liquid fuel

http://www.nanowerk.com/news/newsid=13968.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

¹⁰¹ Biofuels Production from Sunlight and CO₂*Military Implications:*

The military should follow these developments as possible future techniques for more environmentally friendly fuel production systems.

Sources:

Frogs, Foam and Fuel: Researchers Convert Solar Energy to Sugars

<http://www.physorg.com/news187951045.html>

Joule Biotechnologies Secures Pilot Site for Renewable Solar Fuel

<http://joulebio.com/news/2010/joule-biotechnologies-secures-pilot-site-renewable-solar-fuel>

¹⁰² Solid Oxide Fuel Cell Claims Reduced Lifecycle Cost*Military Implications:*

The military should investigate this development as a more environmentally friendly energy source.

Source:

A greener way to get electricity from natural gas

<http://web.mit.edu/newsoffice/2009/natural-gas.html>

High-efficiency power production from natural gas with carbon capture

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TH1-4XJG5KY-3&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=56b56fc929eb0e36ed13f9567bbca539

(Abstract)

¹⁰³ Nanofibers Provide Energy-efficient White Light*Military Implications:*

Although the developers say that commercial products will not be available for three to five years, the military should follow this technology for its promise of more energy-efficient illumination or may want explore ways to speed the development process.

Source:

Researchers Develop Nanofiber-Based Technology to Make Energy-Efficient Lighting

<http://www.physorg.com/news185048189.html>

¹⁰⁴ Changing Temperature Changes Roof Tiles from Black to White to Save Energy*Military Implications:*

The military should investigate the possible use of this technique in military installations to conserve energy.

Source:

Energy savings in black and white

<http://web.mit.edu/newsoffice/2009/madmec-roof.html>

Technologies for New Generation of Cars

¹⁰⁶ Techniques Provide Improved Lithium-ion Battery Performance

Military Implications:

The military should follow all these developments as they seem to hold promise of continued increases in the performance of environment-sparing power sources.

Sources:

Nanowire Advance for Lithium Batteries

<http://www.technologyreview.com/energy/23240/page1/>

Carbon–Silicon Core–Shell Nanowires as High Capacity Electrode for Lithium Ion Batteries

<http://pubs.acs.org/doi/abs/10.1021/nl901670t>

Superior cathode material for electrochemical energy storage devices

<http://www.nanowerk.com/news/newsid=12231.php>

Next Alternative Introduces Car Battery With Carbon Nanotube Technology

<http://www.nanowerk.com/news/newsid=12068.php>

¹⁰⁷ Electric Vehicle Powered by Sodium-Nickel-Chloride Batteries

Military implications:

The military should consider examining this electric vehicle technology, along with other electric prime movers that might be under evaluation.

Source:

Iveco launches the Daily Electric in Brazil

<http://www.iveco.com/en-us/PressRoom/PressRelease/Pages/DailyElettricoBrasile.aspx>

¹⁰⁸ New Ceramic Membrane Enhances Battery Performance

Military Implications:

The military should investigate this development for its usefulness in renewable energy storage applications.

Source:

New battery could change world, one house at a time

http://www.heraldextra.com/news/article_b0372fd8-3f3c-11de-ac77-001cc4c002e0.html

¹⁰⁹ New Low-cost, Durable Hydrogen Producing System

Military Implications:

The military should evaluate these developments as a hydrogen source for environmentally friendly fuel cells.

Sources:

New photocatalytic method for the clean production of hydrogen from water

http://www.nanowerk.com/news/newsid=14748.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Water Splitting by Visible Light: A Nanophotocathode for Hydrogen Production

<http://www3.interscience.wiley.com/journal/123275459/abstract?CRETRY=1&SRETRY=0>
(Requires acceptance of cookies.)

¹¹⁰ New Developments in Hydrogen Production

Military Implications:

The military should follow these developments for their possible future application in environment-sparing power sources.

Sources:

Catalyst could power homes on a bottle of water, produce hydrogen on-site (w/ Video)

<http://www.physorg.com/news187031401.html>

Water oxidation advance boosts potential for solar fuel

<http://www.nanowerk.com/news/newsid=15268.php>

Scavenging energy waste to turn water into hydrogen fuel

<http://www.nanowerk.com/news/newsid=15264.php>

Nanotechnology artificial leaves for hydrogen production

<http://www.nanowerk.com/spotlight/spotid=15381.php>

Light Harvesting: Artificial Inorganic Leafs for Efficient Photochemical Hydrogen Production
Inspired by Natural Photosynthesis (Adv. Mater. 9/2010)

<http://www3.interscience.wiley.com/journal/123301807/abstract?CRETRY=1&SRETRY=0>

¹¹¹ Nano Gold May Offer Miniaturized Photoelectric Cell

Military Implications:

The military should follow the progress of this work for its application to power supplies for highly portable data storage and communication and environmental sensing systems.

Sources:

Scientists turn light into electrical current using a golden nanoscale system

<http://www.physorg.com/news185378650.html>

Plasmon-Induced Electrical Conduction in Molecular Devices

<http://pubs.acs.org/doi/abs/10.1021/nm901148m>

¹¹² Elements of Prototype Tsunami Prediction System Tested

Military Implications:

The military should follow the development of this capability in order to be prepared to apply it to measures for the protection of coastal military installations from tsunami damage.

Source:

NASA Demonstrates Tsunami Prediction System

<http://www.physorg.com/news195755113.html>

113 Multi-component Environmental Sensing System Could Help Anticipate Crises

Military Implications:

The military should investigate this development to see if it could improve elements of its own environmental assessment and anticipation systems.

Source:

Sensing disasters from space

<http://www.physorg.com/news175441355.html>

114 Landslide-Predicting Sensors to Be Developed

Military Implications:

The military should follow this development for its applicability in systems for the protection of military installations and equipment from landslides.

Source:

New sensors to predict landslides

http://www.soton.ac.uk/mediacentre/news/2010/apr/10_40.shtml

115 European Space Agency's Soil Moisture and Ocean Salinity Mission to Help Improve Water Management

Military implications:

The military should see if SMOS information adds information or augments current satellite input to U.S. environmental security early warning systems.

Sources:

First images from ESA's water mission

http://www.esa.int/SPECIALS/smos/SEMOGN3KV5G_0.html

116 New UN Satellite Standards to Help in Natural Disaster Situations

Military implications:

Relevant military disaster liaisons should review these standards for military-to-military disaster training and coordination with civilian and UN agencies.

Sources:

New ITU standards enhance satellite communications for emergencies

http://www.itu.int/newsroom/press_releases/2010/13.html

Technologies that Could Trigger New Forms of Arms Race

118 Synthetic Gene Ordering Security Screening Up for Discussion

Military Implications:

Military personnel concerned with biosecurity should consider actively participating in these discussions, in which, reportedly, no government agency has offered an opinion, although a number have been working on the problem.

Sources:

Gene-synthesis industry at odds over how to screen DNA orders

<http://www.k8science.org/news/news.cfm?art=5579>

K8 Science

<http://www.K8Science.org>

IASB Workshop

<http://www.ia-sb.eu/go/synthetic-biology/activities/press-area/press-information/workshop-on-synthetic-biology/>

119 Computer-Designed Genome Creates First “Artificial Cell”

Military Implications:

This new achievement raises the specter of designer bioweapons being created and deployed some day in the future by individuals, as well as the nearer-term possibilities of governments and terrorist organizations creating them. If not already created, an ongoing system for forecasting artificial biology with security implications should be established and connected to the potential negotiators of international standards and treaties and to civilian labs such as the J. Craig Venter Institute to anticipate and help put in place standards and military-to-military training.

Sources:

First Self-Replicating Synthetic Bacterial Cell

<http://www.jcvi.org/cms/press/press-releases/full-text/article/first-self-replicating-synthetic-bacterial-cell-constructed-by-j-craig-venter-institute-researcher/>

Artificial life? Synthetic genes 'boot up' cell

<http://www.reuters.com/article/idUSTRE64J5RY20100526>

NBICS and generation of synthetic organisms

<http://politicsofhealth.org/wol/2010-05-30.htm>

You may soon be visited by an FBI agent, or a scientist acting on behalf of one. Here's why

<http://www.the-scientist.com/article/display/57355/>

120 Botox Creates Basis for New Terrorist Weapon

Military implications:

Since most sales and acquisitions of counterfeit pharmaceuticals are made over the Internet, efforts should increase for enforcing homogeneous global regulations and monitoring of online activities. The military should increase its collaboration with counterparts around the world as part of their antiterrorism activities.

Sources:

Officials fear toxic ingredient in Botox could become terrorist tool

<http://www.washingtonpost.com/wp-dyn/content/article/2010/01/24/AR2010012403013.html>

Toxin Found in Botox Could Pose Bioterrorism Threat

http://gsn.nti.org/gsn/nw_20100125_2898.php

¹²¹ International Legal Frameworks Needed for Cybersecurity*Military Implications:*

The military should increase its efforts to raise the profile of these issues to improve global cybersecurity strategy, and design for international legal frameworks, norms, and standards with enforcement measures.

Sources:

NATO's cyber-brains gaze at the future of war

http://www.spacewar.com/reports/NATOs_cyber-brains_gaze_at_the_future_of_war_999.html

Shadows in the Cloud: An investigation into cyber espionage 2.0

<http://www.infowar-monitor.net/2010/04/shadows-in-the-cloud-an-investigation-into-cyber-espionage-2-0-2/>

LockMart Supports National Security Agency's 2010 Cyber Defense Exercise

http://www.spacewar.com/reports/LockMart_Supports_National_Security_Agency_2010_Cyber_Defense_Exercise_999.html

EU to set up anti-cybercrime body

<http://euobserver.com/9/29946/?rk=1>

¹²² Reconsidering the Rules for Space Security*Military Implications:*

There is increasing agreement that the Outer Space treaty should be updated in view of current and future challenges concerning space security. This book is a source of information for those efforts.

Source:

Reconsidering the Rules for Space Security

<http://www.amacad.org/publications/reconsidering.aspx>

B. Preventing or Responding to Environmentally Caused Conflicts**SECURITY IMPLICATIONS OF ENVIRONMENTAL ASPECTS**¹²⁵ **Climate Change Threats Increasingly Top Security Agendas***Military Implications:*

These reports should be studied by military personnel responsible for developing climate change mitigation and adaptation policies, strategies and training. Those creating military-to-military

plans should consider the potential for creating a coherent global security prevention and response plan to address the accelerating threats deriving from climate change.

Sources:

The Role of the Military in Climate Change and Security

http://www.brookings.edu/events/2009/1029_climate_change_military.aspx

"Warming increases the risk of civil war in Africa"

<http://www.pnas.org/content/early/2009/11/20/0907998106.abstract?sid=ac21d18b-7233-4f73-b03b-061beacd7ced>

Climate and Energy the Dominant Challenges of the 21st Century

http://www.acus.org/new_atlanticist/environmental-threats

The war against warming

<http://www.nature.com/climate/2009/0912/full/climate.2009.120.html>

Climate change could boost incidence of civil war in Africa, study finds

http://www.berkeley.edu/news/media/releases/2009/11/23_africa_climate_change.shtml

¹²⁶ Climate Change at the UN and G-20

Military Implications:

The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources:

General Debate of the 64th Session; 23-26 & 28-30 September 2009

<http://www.un.org/ga/64/generaldebate/2309.shtml>

New General Assembly President opens session with call for UN reform

<http://www.un.org/apps/news/story.asp?NewsID=32069&Cr=General+assembly&Cr1=>

G-20 Leaders Commit to Tackle Energy and Climate Change

<http://climate-l.org/2009/09/28/g-20-leaders-commit-to-tackle-energy-and-climate-change/>

Leaders' Statement: The Pittsburgh Summit

<http://www.pittsburghsummit.gov/mediacenter/129639.htm>

Nations Appear Headed Toward Independent Climate Goals

<http://www.washingtonpost.com/wp-dyn/content/article/2009/09/22/AR2009092201137.html>

Obama, China vow urgent action on climate change

<http://www.google.com/hostednews/ap/article/ALeqM5iVseyRMTWU-tI-9-sDhfCCJEk4vgD9ASM0980>

Ahead of Copenhagen talks, small island nations sound alarm at UN on climate change

<http://www.un.org/apps/news/story.asp?NewsID=32265&Cr=climate+change&Cr1=>

¹²⁷ **Seven Tipping Elements That Could Transform the Planetary Systems**

Military Implications:

The military should identify improvements to interactive dynamic models of such tipping points to produce improved simulations, so that alternative futures could be explored for changes in training, R&D requirements, and military-to-military cooperation.

Sources:

Tipping elements in the Earth System. Hans Joachim Schellnhuber, PNAS December 8, 2009, vol. 106, no. 49, 20561-20563

<http://www.pnas.org/content/106/49/20561.full>

7 Tipping Points That Could Transform Earth

<http://www.wired.com/wiredscience/2009/12/tipping-elements/all/1>

¹²⁸ **The Haiti Earthquake Disaster Could Stimulate Improved Resilience Planning**

Military Implications:

Military organizations should use the Haitian disaster to refine mechanisms for cooperation with UN agencies, NGOs, and governmental aid agencies to improve systems and training, preparedness and response capacity to natural disasters. While joint regulations governing operations other than war (OOTW) were significantly revised in the 1990's, they should be reviewed with regard to shortening the time to get boots and commodities on the ground. Of particular concern would be improving mechanisms for unleashing military capabilities almost instantly upon realization of a major disaster.

Sources:

United Nations Stabilization Mission in Haiti

<http://www.un.org/en/peacekeeping/missions/minustah/>

Earthquake jeopardizes Haiti's security and stability

http://www.isria.com/M/Weekly_Report_20100118.htm

Haiti earthquake: death toll may hit 200,000

<http://www.telegraph.co.uk/news/worldnews/centralamericaandthecaribbean/haiti/7003057/Haiti-earthquake-death-toll-may-hit-200000.html>

UNEP to lead environmental recovery efforts in Haiti

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=608&ArticleID=6448&l=en>

¹²⁹ **Environmental Performance Index 2010 Score Worse for Vulnerable States**

Military Implications:

Military personnel involved in rebuilding and vulnerability assessments should study this report and its indicators to determine how their own assessments can be improved.

Source:

Environmental Performance Index 2010

<http://epi.yale.edu/>

¹³⁰ Monopoly over Rare Earth Elements Raises Security and Environmental Concerns*Military Implications:*

In addition to continued research on substitute materials and processes, defense authorities should encourage political leaders to consider all options, including government subsidies, if necessary, to secure supply of critical REEs. The focus for assuring at least national defense needs should be on national sources and regions that are reliable and practice fair environmental, work, and pricing policies.

Sources:

The Battle Over Rare Earth Metals

http://www.ensec.org/index.php?option=com_content&view=article&id=228:the-battle-over-rare-earth-metals&catid=102:issuecontent&Itemid=355

EXCLUSIVE: Inside China's secret toxic unobtainium mine

<http://www.dailymail.co.uk/news/article-1241872/EXCLUSIVE-Inside-Chinas-secret-toxic-unobtainium-mine.html>

¹³¹ The Competition for Rare Earth Metals Set to Continue*Military Implications:*

[Same as previous on this issue] In addition to continued research on substitute materials and processes, defense authorities should encourage political leaders to consider all options, including government subsidies, if necessary, to secure supply of critical REEs. The focus for assuring at least national defense needs should be on national sources and regions that are reliable and practice fair environmental, work, and pricing policies.

Source:

Why China holds 'rare' cards in the race to go green

<http://news.bbc.co.uk/2/hi/8689547.stm>

¹³² The Race for Natural Resources a Potential Impediment for Peace*Military Implications:*

The discovery of new minerals coupled with the current instability in Afghanistan could increase conflict in the region. The coalition forces should explore additional efforts to work with the Afghan government to improve its capability to withstand conflict over the control of mineral wealth.

Sources:

World's Mining Companies Covet Afghan Riches

<http://www.nytimes.com/2010/06/18/world/asia/18mines.html?ref=world>

Next for Afghanistan, the Curse of Plenty?

<http://www.nytimes.com/2010/06/20/weekinreview/20mcneil.html>

Death by Gadget

<http://www.nytimes.com/2010/06/27/opinion/27kristof.html>

¹³³ EU Expert Group Suggests Action to Secure 14 Critical Raw Materials*Military Implications:*

The military should take the European effort into account in its own activities in this area of rare resource availability.

Sources:

Defining critical raw materials

http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm

Meridian Nanotechnology and Development News 6/18

<http://www.merid.org/nanodev/more.php?articleID=2691>

EU to step up raw materials 'diplomacy'

<http://www.euractiv.com/en/sustainability/eu-step-up-raw-materials-diplomacy-news-495397>

¹³⁴ Climate Change Requires Water Management Changes*Military Implications:*

Relevant military personnel should review the Hashimoto Action Plan II and The Pacific Institute's report for potential applications under the Army Strategy for the Environment and for military-to-military program changes to reduce the likelihood of climate change-induced water resource conflicts.

Sources:

Climate Change and Transboundary Waters

http://www.pacinst.org/reports/transboundary_waters/index.htm

Understanding and Reducing the Risks of Climate Change for Transboundary Waters

http://www.pacinst.org/reports/transboundary_waters/transboundary_water_and_climate_report.pdf

Water and Conflict Chronology

<http://www.worldwater.org/conflict/index.html>

The Hashimoto Action Plan II

http://www.unsgab.org/HAP-II/HAP-II_en.pdf

¹³⁵ Yemen's Internal Conflicts Are Water-Induced*Military Implications:*

Military aid to Yemen is not likely to prevent increased instability unless a major effort is included to turn around the water situation. Those planning military cooperation with Yemen should include significant efforts to improve water and agricultural development in their deliberations.

Sources:

Water woes could undermine Yemen's drive against Al-Qaeda

<http://www.google.com/hostednews/afp/article/ALeqM5hRiwhJYeUXY1B3Ma2oCfQVE0G9v>

[A](#)

Private sector considers desalination to save Yemen from drought

http://www.yementimes.com/defaultdet.aspx?SUB_ID=33426

¹³⁶ Reports addressing the Link between Climate Change and Conflict*Military Implications:*

The military might consider the reports for input to addressing environment-related conflict issues.

Sources:

'Human Securitising' the Climate Security Debate

http://www.rsis.edu.sg/NTS/resources/research_papers/MacArthur_working_paper_Lorraine%20Elliott.pdf

Climate Conflict: how global warming threatens security and what to do about it - Launch

<http://www.iiss.org/whats-new/iiss-podcasts/adelphi-webcasts/climate-conflict/>

Climate conflict: how global warming threatens security and what to do about it

<http://sustainablesecurity.org/article/climate-conflict-how-global-warming-threatens-security-and-what-do-about-it>

¹³⁷ State of the World 2010 Calls for a New Paradigm in Addressing Security*Military Implications:*

The report is an overview of the potentially forthcoming changes in systems of values, including security, and thus could be a useful source of information for planning and strategy design.

Source:

State of the World 2010. *Transforming Cultures: From Consumerism to Sustainability*

<http://blogs.worldwatch.org/transformingcultures/contents/>

Arctic Debate**¹³⁹ Arctic Debates Continue***Military Implications:*

Military-to-military collaboration should increase among all the Arctic countries to support friendly political and economic negotiations and to assure security in the increasingly vulnerable region.

Sources:

Canada's 'Arctic Summit' highlights global tensions, competing interests

<http://www.canada.com/news/Canada-Arctic-Summit-highlights-global-tensions-competing-interests/2736963/story.html>

Medvedev says that Russia must push its claim to Arctic resources

http://ca.news.yahoo.com/s/capress/100317/world/eu_russia_arctic_claim

National security challenged by Arctic climate change. BarentsObserver, 2010-03-23

<http://www.barentsobserver.com/national-security-challenged-by-arctic-climate-change.4762526-58932.html>

Arms Control Advocates Call for Nuke-Free Arctic Zone

http://gsn.nti.org/gsn/nw_20100310_5264.php

¹⁴⁰ Arctic “Pole of Peace” Suggested to Address Arctic Security Issues

Military Implications:

[Similar to previous on this issue] The likelihood of potential new roles for coalition forces in the region is increasing for both national security and protection of the ecosystems. Relevant military personnel should seek improved cooperation with their counterparts in other countries and international organizations in developing proactive strategies, regulations, and enforcement procedures.

Sources:

United States leadership needed in Arctic Ocean

http://juneauempire.com/stories/120309/opi_531556737.shtml

¹⁴¹ Arctic Civil and Military Activities Increasing

Military Implications:

[Similar to previous on this issue] The likelihood of potential new roles of coalition forces in the region is increasing for both national security and protection of the ecosystems. Relevant military personnel should seek improved cooperation with their counterparts in other countries and international organizations in developing proactive strategies, regulations, and enforcement procedures.

Sources:

NASA satellites reveal extent of Arctic sea ice loss

<http://www.guardian.co.uk/environment/2009/jul/08/arctic-ice-ocean>

Global warming to open up north-east Arctic tanker route

<http://www.guardian.co.uk/environment/2009/jul/14/global-warming-tanker-route>

Danish military plans raise fears of northern conflict

<http://thechronicleherald.ca/Canada/1134516.html>

Arctic Marine Shipping Assessment 2009

<http://arcticportal.org/pame/pame-document-library/progress-reports-to-senior-arctic-officials/olgaamsa2009report.pdf>

¹⁴² New Developments by Canada and the U.S. in Arctic Security

Military Implications:

[Similar to previous on this issue] The likelihood of potential new roles of coalition forces in the region is increasing for both national security and protection of the ecosystems. Relevant military personnel should seek improved cooperation with their counterparts in other countries and international organizations in developing proactive strategies, regulations, and enforcement procedures.

Sources:

Harper of the melting North

http://www.economist.com/world/americas/displaystory.cfm?story_id=14313727

Congress hears Alaskan views on Arctic Ocean issues

http://www.alaskajournal.com/stories/082809/loc_8_001.shtml

¹⁴³ Russia and Norway Agree on Maritime Delimitation of Disputed Arctic Territory

Military Implications:

[Same as previous on this issue] Military-to-military collaboration should increase among all the Arctic countries to support friendly political and economic negotiations and to assure security in the increasingly vulnerable region.

Sources:

Russia-Norway pact defuses Arctic tension

<http://euobserver.com/9/29958/?rk=1>

Norway, Russia Strike Deal to Divide Arctic Undersea Territory

<http://www.themoscowtimes.com/business/article/norway-russia-strike-deal-to-divide-arctic-undersea-territory/404939.html>

¹⁴⁴ Russia Suggests Opening New Transportation Corridor via the Arctic

Military Implications:

[Same as previous on this issue] Military-to-military collaboration should increase among all the Arctic countries to support friendly political and economic negotiations and to assure security in the increasingly vulnerable region.

Source:

Arctic shipping route is safer

<http://english.ruvr.ru/2010/05/26/8505969.html>

¹⁴⁵ Arctic Opens to International Commercial Use

Military Implications:

In view of the opening of the Arctic for the first commercial projects, the coalition forces in the region should accelerate developing strategies for both national security and protection of ecosystems. Relevant military personnel should seek improved cooperation with counterparts in other countries and international organizations in developing proactive strategies, regulations, and enforcement procedures.

Sources:

Global warming opens up Arctic for undersea cable

<http://www.nation.co.ke/InDepth/Africa%20Insight/-/625262/847148/-/wxhyixz/-/index.html>

Climate Change and Arctic Sustainable Development

http://publishing.unesco.org/details.aspx?&Code_Livre=4722&change=E

¹⁴⁶ Canada to Map about 2,500 miles of Arctic Seafloor*Military Implications:*

The military should explore how collaboration with the Canadian mapping project could improve international cooperation in developing proactive strategies, regulations, and enforcement procedures to reduce the likelihood of future conflicts.

Sources:

About five percent of the Arctic floor has been mapped with modern sonar technology.

Canada Will Use Robot Subs to Map Arctic Sea Floor, Boost Territorial Claims

<http://www.nytimes.com/gwire/2010/02/10/10greenwire-canada-will-use-robot-subs-to-map-arctic-sea-f-45098.html>

NATURAL DISASTERS AND SCIRNTIFIC EVIDENCES**Scientific Evidences and Potential Consequences***Military Implications:*

[Same as other on similar issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change increases the rate of emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

*Sources (listed by month):*¹⁴⁹ **June 2010**

May 2010 was warmest on record: U.S. government data

<http://www.reuters.com/article/idUSTRE65E63F20100616>

Climate Action Tracker

www.climateactiontracker.org

¹⁵⁰ **May 2010**

Ocean Stored Significant Warming Over Last 16 Years

http://www.noaanews.noaa.gov/stories2010/20100519_ocean.html

Man-made climate change blamed for 'significant' rise in ocean temperature

<http://www.independent.co.uk/environment/climate-change/manmade-climate-change-blamed-for-significant-rise-in-ocean-temperature-1977669.html>

Europe's scientists call for more effort in tackling rising ocean acidity

http://www.eurekalert.org/pub_releases/2010-05/esf-esc051810.php

"Double trouble" in acidic, warming oceans – study

<http://in.reuters.com/article/idINIndia-48634120100519>

151 April 2010

Global Temperatures Last Month Broke Heat Records for March

<http://www.ens-newswire.com/ens/apr2010/2010-04-16-01.html>

CO₂ Emissions Causing Ocean Acidification to Progress at Unprecedented Rate

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12904>

Oceans' Saltiness Reaching Extremes

<http://news.discovery.com/earth/oceans-saltier-salinity-warming.html>

152 March 2010

Current GISS Global Surface Temperature Analysis

http://data.giss.nasa.gov/gistemp/paper/gistemp2010_draft0319.pdf

Global cooling is bunk, draft NASA study finds

<http://www.dailyclimate.org/tdc-newsroom/2010/03/global-cooling-is-bunk-draft-nasa-study-finds>

Australia '0.7 degrees warmer over past 50 years'

<http://www.google.com/hostednews/afp/article/ALeqM5gSMhzJlxY-feCKAbLpnD0sZy3G1Q>

Oz has hottest-ever summer

http://www.iol.co.za/index.php?set_id=1&click_id=143&art_id=nw20100301095130980C303860

Droughts bring severe damage to some Asian countries

http://www.nst.com.my/Current_News/NST/articles/20100327120018/Article/index_html

CO₂ at new highs despite economic slowdown

<http://www.reuters.com/article/idUSTRE62E2KJ20100315>

153 February 2010

More Ambition Needed if Greenhouse Gases are to Peak in Time, Says New UNEP Report

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=612&ArticleID=6472&l=en&t=long>

WA drought is 'proof of climate change'

<http://news.ninensn.com.au/article.aspx?id=1009360>

Tibet temperature 'highest since records began' say Chinese climatologists

<http://www.guardian.co.uk/environment/2010/feb/05/tibet-warming-china>

'Roof of the world' getting warmer

http://www.chinadaily.com.cn/cndy/2010-02/05/content_9431578.htm

154 January 2010

The resurgence of El Niño means that 2010 could yet be the hottest year on record

<http://www.guardian.co.uk/uk/2010/jan/10/climate-change-uk-big-freeze>

Past Decade Warmest on Record, NASA [NOAA] Data Shows

<http://www.nytimes.com/2010/01/22/science/earth/22warming.html>

Harsh winter a sign of disruptive climate change, report says

<http://www.washingtonpost.com/wp-dyn/content/story/2010/01/28/ST2010012800310.html?sid=ST2010012800310>

Global Warming Bringing More Oddball Winter Weather

<http://www.nwf.org/News-and-Magazines/Media-Center/News-by-Topic/Global-Warming/2010/01-28-10-Global-Warming-Bringing-More-Oddball-Winter-Weather.aspx>

¹⁵⁵ **December 2009**

Global-average temperature data released

<http://www.metoffice.gov.uk/corporate/pressoffice/2009/pr20091208a.html>

Met Office figures confirm noughties as warmest decade in recorded history

<http://www.guardian.co.uk/environment/2009/dec/08/met-office-warmest-decade>

Joint Press Release: 55 Million People Affected by Extreme Weather Disasters in 2009

http://www.unisdr.org/preventionweb/files/12035_PRUNDPUNISDRWMOCCopenhagen14Dec2009.pdf

Global Climate Risk Index 2010 - reflecting most severely affected countries over almost two decades

<http://www.germanwatch.org/presse/2009-12-08e.htm>

¹⁵⁶ **November 2009**

The Copenhagen Diagnosis: Climate Science Report

<http://copenhagendiagnosis.org/>

Climate science update: from bad to worse

<http://newsinfo.inquirer.net/breakingnews/world/view/20091125-238204/Climate-science-update-from-bad-to-worse>

Earth 'heading for 6C' of warming

<http://news.bbc.co.uk/2/hi/science/nature/8364926.stm>

Main Greenhouse Gases Reach Highest Level Ever Since Pre-Industrial Time

http://www.wmo.int/pages/mediacentre/press_releases/pr_868_en.html

Oceans' ability to sequester carbon diminishing

http://news.mongabay.com/2009/1118-hance_ocean_carbon.html

World's Coastal Oceans Warming Faster Than Predicted

http://www.gefweb.org/interior_right.aspx?id=27296

¹⁵⁷ **October 2009**

Arctic seas turn to acid, putting vital food chain at risk

<http://www.guardian.co.uk/world/2009/oct/04/arctic-seas-turn-to-acid>

¹⁵⁸ **September 2009**

Four degrees and beyond

<http://www.metoffice.gov.uk/climatechange/news/latest/four-degrees.html>

Met Office warns of catastrophic global warming in our lifetimes

<http://www.guardian.co.uk/environment/2009/sep/28/met-office-study-global-warming>

Impacts of Climate Change Coming Faster and Sooner: New Science Report Underlines Urgency for Governments to Seal the Deal in Copenhagen

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=596&ArticleID=6326&l=en>

New Analysis Brings Dire Forecast Of 6.3-Degree Temperature Increase

<http://www.washingtonpost.com/wp-dyn/content/article/2009/09/24/AR2009092402602.html>

NOAA: Warmest Global Sea-Surface Temperatures for August and Summer

http://www.noaaneews.noaa.gov/stories2009/20090916_globalstats.html

¹⁵⁹ August 2009

In hot water: World sets ocean temperature record

<http://www.sanluisobispo.com/living/health/story/822072.html>

Global warming could change Earth's tilt

<http://www.newscientist.com/article/dn17657-global-warming-could-change-earths-tilt.html>

Big Tropical Storms in Atlantic Hit 1,000-Year High

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MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES

Climate Refugees Trends

Military Implications:

[Same as other on similar issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change increases the rate of emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

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Military Implications:

[Same as other on similar issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change increases the rate of emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

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Military Implications:

[Same as other on similar issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change increases the rate of emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

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FOOD AND FRESHWATER**Food and Freshwater Scarcity Issues***Military Implications:*

[Same as other on similar issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change increases the rate of emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

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[http://www.africa-union.org/root/ua/Conferences/2010/SA/fev/14-16fev/doc/Official%20Final Summary of The Study%20 %2029%20Sept%20.doc](http://www.africa-union.org/root/ua/Conferences/2010/SA/fev/14-16fev/doc/Official%20Final%20Summary%20of%20The%20Study%20of%20the%20Status%20and%20Prospects%20of%20Agricultural%20Development%20and%20Food%20Security%20in%20Africa%20and%20the%20Arab%20World.doc)

²⁰⁴ CDC launches the National Environmental Public Health Tracking Network*Military implications:*

Military with environmental responsibilities might examine the network for tracking and research purposes, and maintain awareness of the website's coverage of pollution generated by military activities; e.g., hazardous waste and associated health risks.

Sources:

Did polluted water make me sick? Am I living in a cancer cluster?

<http://www.thedailygreen.com/environmental-news/latest/environmental-public-health-tracking-47070603>

National Environmental Public Health Tracking Network, CDC

<http://ephtracking.cdc.gov/showHome.action>

²⁰⁵ Study Shows Deforestation Brings Malaria Epidemics*Military Implications:*

The military should consider such findings in planning bases or military operations. Also, the findings might trigger some specific regulations for areas and the ways deforestation is

performed (including for potential military bases), not only in the Amazon, but in any malarial region.

Sources:

Olson SH, Gangnon R, Silveira GA, Patz JA. Deforestation and malaria in Mâncio Lima county, Brazil. *Emerg Infect Dis* 2010, 16:1108–15. doi: 10.3201/eid1607.091785

<http://www.cdc.gov/eid/content/16/7/1108.htm>

Cleared forests lead to rise in malaria in Brazil

<http://www.reuters.com/article/idUSTRE65F61720100617>

Health-related Climate Change Consequences, Trends and Actions

Military Implications:

[Same as other on similar issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change increases the rate of emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

Sources:

²⁰⁷ **May 2010**

US\$4.4 million awarded for research to build a climate model able to predict outbreaks of infectious disease in Africa

<http://www.ilri.org/ilrinews/index.php/archives/1838>

²⁰⁸ **April 2010**

World Health Day Website

<http://www.who.int/world-health-day/2010/en/index.html>

Commonwealth Secretary-General's Message

http://www.thecommonwealth.org/document/177370/222213/2010_world_health_day.htm

WHO Background Paper “Why urban health matters”

<http://www.who.int/world-health-day/2010/media/whd2010background.pdf>

Commonwealth Secretariat Discussion Paper “The state of the cities: why, and how, the Commonwealth must address the challenge of sustainable urbanization”

<http://www.thecommonwealth.org/files/222182/FileName/DiscussionPaper8.pdf>

²⁰⁹ **March 2010**

WHO and UNDP launch new project for Health adaptation to climate change

http://www.who.int/globalchange/news/climate_change_adaptation/en/index.html

²¹⁰ **February 2010**

Gender, climate change and health

http://www.who.int/globalchange/publications/reports/gender_climate_change/en/index.html

Gender, Climate Change and Health. Draft Discussion Paper

http://www.who.int/globalchange/publications/reports/final_who_gender.pdf

²¹¹ **January 2010**

Protecting health from climate change. Connecting science, policy and people

<http://www.who.int/globalchange/publications/reports/9789241598880/en/index.html>

Protecting Health from Climate Change: Connecting Science, Policy and People:

http://whqlibdoc.who.int/publications/2009/9789241598880_eng.pdf

²¹² **December 2009.**

Global Health Risks

http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf

Protecting health from climate change: Global research priorities

<http://www.who.int/globalchange/publications/9789241598187/en/index.html>

WHO Factfiles: 10 facts on children's environmental health

http://www.who.int/features/factfiles/children_environmental_health/facts/en/index9.html

²¹³ **November 2009**

More health for your buck: health sector functions to secure environmental health

<http://www.who.int/bulletin/volumes/87/11/08-059865/en/index.html>

Taking the heat out of the population and climate debate

<http://www.who.int/bulletin/volumes/87/11/09-072652/en/index.html>

'Feeling the Heat: Climate Change and Child Survival'

http://www.savethechildren.net/alliance/what_we_do/emergencies/climate_change/feelingtheheat.html

Climate change 'can kill children'

http://www.google.com/hostednews/ukpress/article/ALeqM5hcu1bVTifUsTT3o5TuA_fge8oWcA

Climate change threatens lives of millions of children, says charity

<http://www.guardian.co.uk/environment/2009/nov/02/save-the-children-climate-change>

²¹⁴ **October 2009**

Health Problems Heat Up: Climate Change and the Public's Health

<http://healthyamericans.org/reports/environment>

Ailing planet seen as bad for human health

<http://www.washingtonpost.com/wp-dyn/content/article/2009/10/26/AR2009102602402.html?hpid=topnews>

²¹⁵ September 2009

Sexual and reproductive health and climate change

[http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(09\)61643-3/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)61643-3/fulltext)

Fewer emitters, lower emissions, less cost

<http://www.optimumpopulation.org/reducingemissions.pdf>

Study Finds Family Planning Cheapest Way to Prevent Climate Change

http://www.enn.com/top_stories/article/40476

Contraceptives can reduce impact of climate change says Lancet

<http://www.telegraph.co.uk/health/healthnews/6203364/Contraceptives-can-reduce-impact-of-climate-change-says-Lancet.html>

Dengue becoming unstoppable

<http://www.mb.com.ph/articles/219444/dengue-becoming-unstoppable>

ENERGY SECURITY

²¹⁷ Energy Security Challenges for the 21st Century

Military Implications:

This book could be a good source of information and analysis on how energy security could impact world security and which are the vulnerable regions.

Source:

Energy Security Challenges for the 21st Century. A Reference Handbook

http://www.greenwood.com/psi/book_detail.aspx?sku=C9997

²¹⁸ Energy Security Central to China's Energy Plan

Military Implications:

According to Victor Chu, a leading commentator on China and Chairman, First Eastern Investment (Hong Kong and London), at the recent World Economic Forum, the energy-environment is the new focus in US-China relations. As a result, military liaisons in China may have new opportunities to seek collaboration with their Chinese counterparts on sustainable energy cooperation.

Sources:

Security Tops the Environment in China's Energy Plan

<http://www.nytimes.com/2010/06/18/business/global/18yuan.html>

Security tops climate in China

<http://www.telegram.com/article/20100620/NEWS/6200594/1002/BUSINESS>

PREVENTION AND ADAPTATION

²²⁰ **New Flood Center to Develop Warning Systems**

Military Implications:

Appropriate military personnel should follow the Center's work in order to apply it to planning for the protection of military installations.

Source:

Better Prediction Sought for Devastating Floods

http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=115479&WT.mc_id=USNSF_1

Global and Regional Initiatives

Military Implications:

[Same for all on similar issues] Increasingly more compelling evidence and warnings on climate change amplify international discourse and increase the emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects. Hence, the military should be doing its part in reducing greenhouse gas emissions and preparing to help mitigate the human-made and natural catastrophes that could ensue.

Sources: (Listed by month in reverse chronological order)

²²² **June 2010**

EU Press Release:

http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/115143.pdf

Conclusion on Water Security:

<http://register.consilium.europa.eu/pdf/en/10/st10/st10497.en10.pdf>

World Congress on Cities and Adaptation to Climate Change website

<http://resilient-cities.iclei.org/bonn2010/home/>

World Congress on Cities and Adaptation to Climate Change--Session on food security

<http://resilient-cities.iclei.org/bonn2010/program/sunday-30-may/parallel-sessions-g/#c259>

²²³ **May 2010**

GBO-3 Website

<http://gbo3.cbd.int>

New vision required to stave off dramatic biodiversity loss, says UN report

<http://www.cbd.int/doc/press/2010/pr-2010-05-10-gbo3-en.pdf>

African professionals push green building agenda

<http://www.unhabitat.org/content.asp?cid=8310&catid=5&typeid=6&subMenuId=0>

Conference Green Building

<http://www.unhabitat.org/categories.asp?catid=640>

Declaration on Green Building

http://www.unhabitat.org/downloads/docs/8313_12630_GreenBldgRatingAfricaFINAL.pdf

224 April 2010

African ministers adopt the extended Programme of Action

<http://www.unisdr.org/news/v.php?id=13655>

UN/ISDR Releases Report on Lessons Learned from Local DRR

<http://climate-1.org/2010/04/21/unisdr-releases-report-on-lessons-learned-from-local-drr/>

Economic Report on Africa 2010 calls for job creation to be a priority for African countries.

http://www.uneca.org/eca_resources/Press_Releases/2010_pressreleases/pressrelease2810.html

16th ASEAN Summit Website

http://asean2010.vn/asean_en/news/46

ASEAN Leaders' Statement: <http://www.aseansec.org/24515.htm>

225 March 2010

UN faces problems coping with natural disasters, minister warns

<http://www.guardian.co.uk/world/2010/mar/28/un-disasters-policy>

Aid must double to respond to natural disasters, UN warned

<http://www.independent.co.uk/news/world/politics/aid-must-double-to-respond-to-natural-disasters-un-warned-1929992.html>

Screening Tools and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance – A Stocktaking Report

http://content.undp.org/go/cms-service/download/asset/?asset_id=2386947

Global Futures. New project to identify best approaches to improve agriculture in developing countries

http://www.ifpri.org/pressrelease/global-futures?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+Ifpriupdate+%28IFPRI+Website+Update%29

226 February 2010

Rapid urbanization a major challenge for Africa

<http://www.unhabitat.org/content.asp?cid=7953&catid=5&typeid=6&subMenuId=0>

Density and Disasters: Economics of Urban Hazard Risk (UNU-WIDWR)

http://www.wider.unu.edu/publications/newsletter/articles-2010/en_GB/02-2010-Lall-Deichmann/

227 January 2010

WMO Information Note

<http://www.wmo.int/pages/mediacentre/infonotes/GlobalCryosphere.html>

Helen Clark Remarks at Joint Session of Executive Board

<http://content.undp.org/go/newsroom/2010/january/helen-clark-remarks-at-joint-session-of-executive-board.en>

UNDG, Integrating Disaster Risk into the CCA and UNDAF:

http://www.undg.org/docs/9866/UNDG-DRR-Guidance-Note-2009_DUP_08-07-2009_11-43-02-734_AM.PDF

Transboundary flood risk management: experiences from the UNECE region

http://www.unece.org/env/water/mop5/Transboundary_Flood_Risk_Management.pdf

²²⁸ December 2009

Climate Change, Conflict and Fragility

http://www.international-alert.org/press/Climate_change_conflict_and_fragility_Nov09.pdf

Copenhagen: Creating a Climate for Conflict?

<http://abcnews.go.com/International/copenhagen-climate-change-fuel-armed-conflict/story?id=9277441>

Copenhagen climate conference: Cash for climate change could encourage warfare

<http://www.telegraph.co.uk/earth/copenhagen-climate-change-confe/6703640/Copenhagen-climate-conference-Cash-for-climate-change-could-encourage-warfare.html>

Linking Climate Change Policies to Human Development Analysis and Advocacy

http://hdr.undp.org/en/media/Climate_Change_NHDR_Guidance_Note.pdf

²²⁹ November 2009

UNISDR 2010-2011 Biennial Work Programme

<http://www.unisdr.org/news/v.php?id=11801>

First global scientific effort to examine the linkages between disaster risk reduction and climate change adaptation

<http://www.unisdr.org/news/v.php?id=11682>

Climate Vulnerable Countries Issue Declaration for Copenhagen

<http://climate-l.org/2009/11/16/climate-vulnerable-countries-issue-declaration-for-copenhagen/>

The Economics of Ecosystems and Biodiversity for National and International Policy Makers; Summary: Responding to the Value of Nature

<http://www.teebweb.org/LinkClick.aspx?fileticket=I4Y2nqqliCg%3d&tabid=1278&language=en-US>

Big profit from nature protection

<http://news.bbc.co.uk/1/hi/sci/tech/8357723.stm>

EU puts €100bn-a-year price on tackling climate change

<http://www.guardian.co.uk/environment/2009/oct/30/eu-climate-change-funding-deal>

UNFPA State of the World Population 2009

http://www.unfpa.org/swp/2009/en/pdf/EN_SOWP09.pdf

Women Central to Efforts to Deal With Climate Change, Says New UNFPA Report

<http://www.unfpa.org/public/News/pid/4259>

²³⁰ October 2009

African Parliamentarians agree on concrete actions to reduce the impact of climatic disasters

<http://www.unisdr.org/news/v.php?id=11479>

SADC commits to disaster risk reduction

<http://www.newera.com.na/article.php?articleid=7479>

Africa demands reparation for ills committed by major polluters

http://news.xinhuanet.com/english/2009-10/13/content_12225422.htm

7th World Forum on Sustainable Development

http://www.fmdd.fr/english_version.html

Africa comes together in Burkina to talk about climate change

<http://content.undp.org/go/newsroom/2009/october/lafrique-runie-au-burkina-sur-le-thme-des-changements-climatiques-en>

Managing our coastal zone in a changing climate The time to act is now House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts

<http://www.aph.gov.au/House/committee/ccwea/coastalzone/report.htm>

Exotic disease risk rises

<http://www.smh.com.au/environment/exotic-disease-risk-rises-20091026-hgrj.html>

²³¹ **September 2009**

The World Economic and Social Survey 2009

<http://www.un.org/esa/analysis/wess/>

Poor nations need 'wartime' support against climate change: UN

http://www.google.com/hostednews/afp/article/ALeqM5ixZD_wT-1BIN8uvnLkwIE-m1JvfQ

Major new fund needed to boost communities' climate solutions

<http://www.christianaid.org.uk/pressoffice/pressreleases/September2009/major-new-fund-needed-for-communities-to-adapt-to-climate-change.aspx>

World Development Report 2010

<http://go.worldbank.org/ZXULQ9SCC0>

World Bank Report Slams 'Inertia' in the Face of Climate Change

<http://www.nytimes.com/cwire/2009/09/15/15climatewire-world-bank-report-slams-inertia-in-the-face-18561.html>

World Climate Conference Bulletin

<http://www.iisd.ca/ymb/climate/wcc3/>

Climate Change: Early Warning Systems for the Coming Storm

<http://www.ipsnews.net/news.asp?idnews=48278>

In Geneva, Designing a Global Climate-Alert System

<http://www.time.com/time/health/article/0,8599,1919932,00.html>

The Economic Council of Western African States (ECOWAS) press release

<http://news.ecowas.int/presseshow.php?nb=090&lang=en&annee=2009>

²³² **August 2009**

New UN scheme to help poor countries weather economic crisis, climate change

<http://www.un.org/apps/news/story.asp?NewsID=31678&Cr=climate+change&Cr1=>

Assessing the costs of adaptation to climate change: A critique of the UNFCCC estimates

<http://www.iied.org/pubs/display.php?o=11501IIED>

Costs of adapting to climate change significantly under-estimated

<http://www.iied.org/climate-change/key-issues/economics-and-equity-adaptation/costs-adapting-climate-change-significantly-under-estimated>

Africa wants \$67 billion a year to fight climate change

<http://www.reuters.com/article/environmentNews/idUSTRE57N26M20090824>

Landslide Impacts Can Be Reduced

<http://www.unisdr.org/news/v.php?id=10775>

²³³ **July 2009**

IPCC to help prepare for short-term climate extremes

<http://www.irinnews.org/Report.aspx?ReportId=85372>

UNISDR Press Release (July 7, 2009), “G8 Summit ‘promises much’ on Disaster Risk

Reduction” <http://www.unisdr.org/eng/media-room/press-release/2009/pr-2009-11-G8-MOB-Press%20Release.pdf>

CLIMATE MODELING

Military Implications:

[Same for all on similar issues] Increasingly more compelling evidence and warnings on climate change amplify international discourse and increase the emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects. Hence, the military should be doing its part in reducing greenhouse gas emissions and preparing to help mitigate the human-made and natural catastrophes that could ensue.

Sources:

²³⁵ **June 2010**

The international forum on GHG reduction analysis models

<http://www.korea.net/news.do?mode=detail&guid=47926>

Defense Experts Want More Explicit Climate Models

<http://www.nytimes.com/cwire/2010/06/24/24climatewire-defense-experts-want-more-explicit-climate-m-35887.html>

²³⁶ **May 2010**

Europe's Plan to Simulate the Entire Planet

<http://www.technologyreview.com/blog/arxiv/25126/?a=f>

The FuturICT Knowledge Accelerator

<http://www.futurict.ethz.ch/FuturICT>

237 February 2010

Tropical cyclones and climate change. Nature Geoscience (2010) doi:10.1038/ngeo779 Review

<http://www.nature.com/ngeo/journal/vaop/ncurrent/abs/ngeo779.html>

Has Global Warming Affected Atlantic Hurricane Activity?

<http://www.gfdl.noaa.gov/global-warming-and-hurricanes>

Projection Shows Water Woes Likely Based on Warmer Temperatures

<http://www.sciencedaily.com/releases/2010/02/100217093258.htm>

238 January 2010

Stronger hurricanes predicted for around Haiti

<http://www.scidev.net/en/news/stronger-hurricanes-predicted-for-around-haiti.html>

Models Foresee More-Intense Hurricanes in the Greenhouse

<http://www.sciencemag.org/cgi/content/full/327/5964/399?ijkey=EFIfVe870I6Bg&keytype=ref&siteid=sci>

Strongest Hurricanes May Double in Frequency, Study Says

<http://news.nationalgeographic.com/news/2010/01/100121-hurricanes-global-warming/>

Most powerful hurricanes on the rise

<http://www.nature.com/news/2010/100121/full/news.2010.24.html> (abstract; full text by subscription)

Global warming could lead to rise in powerful hurricanes

<http://news.oneindia.in/2010/01/22/globalwarming-could-lead-to-rise-in-powerfulhurricanes.html>

239 November 2009

Aerosols cloud the climate picture

http://www.sciencenews.org/view/generic/id/48940/title/Aerosols_cloud_the_climate_picture

Climate change catastrophe took just months

<http://www.timesonline.co.uk/tol/news/science/earth-environment/article6917215.ece>

240 September 2009

C-ROADS: A New Climate Change Model Used By Diplomats

<http://www.bgrncol.com/>

Climate change may trigger earthquakes and volcanoes

<http://www.newscientist.com/article/mg20327273.800-climate-change-may-trigger-earthquakes-and-volcanoes.html?full=true>

Climate Forcing of Geological and Geomorphological Hazards

http://www.abuhrc.org/newsmedia/Pages/event_view.aspx?event=5

Aon Benfield UCL Hazard Research Centre

<http://www.abuhrc.org/Pages/index.aspx>

Climate change: melting ice will trigger wave of natural disasters

<http://www.guardian.co.uk/environment/2009/sep/06/global-warming-natural-disasters-conference>

²⁴¹ **August 2009**

Study links drought with rising emissions

<http://www.smh.com.au/environment/global-warming/study-links-drought-with-rising-emissions-20090815-elpf.html>

²⁴² **July 2009**

World will warm faster than predicted in next five years, study warns

<http://www.guardian.co.uk/environment/2009/jul/27/world-warming-faster-study>

²⁴³ **December 2009**

Projected global warming under a worldwide climate policy following Switzerland's example

http://www.greenpeace.ch/fileadmin/user_upload/Downloads/de/Klima/Klimastudie/2009_Stu_Projected_global_warming.pdf

²⁴⁴ **October 2009**

World 'Has Five Years' to Stop Climate Change

<http://allafrica.com/stories/200910190109.html>

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 JULY 2008

²⁴⁷ **Draft European Transboundary Guidance on Water and Adaptation to Climate Change**

Military Implications:

The Guidance might provide a framework to military involved in activities related to climate change adaptation and mitigation involving transboundary waters in Europe.

Sources:

Draft Guide to implementing the Convention

http://www.unece.org/env/documents/2009/Wat/mp_wat/ECE_mp.wat_2009_L2_%20E.pdf

Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Fifth session, 10-12 November 2009

<http://www.unece.org/env/water/mop5.htm>

²⁴⁸ **UNECE Guidance on Water and Adaptation to Climate Change**

Military Implications:

The Guidance on Water and Adaptation to Climate Change should be reviewed by military personnel involved in activities concerning transboundary issues.

Source:

Guidance on Water and Adaptation to Climate Change

http://www.unece.org/env/documents/2009/Wat/mp_wat/ECE_MP.WAT_30_E.pdf

²⁴⁹ EPA Issues New Regulations on Water Pollution from Construction

Military Implications:

The military should review its and its contractors' construction practices to ensure that they conform to the new regulations, especially since it is very likely that similar rules will, over time, come into force in other jurisdictions worldwide, if not already in place.

Sources:

Construction and Development. Final Effluent Guidelines

<http://www.epa.gov/waterscience/guide/construction>

EPA Issues Rule to Reduce Water Pollution from Construction Sites

<http://yosemite.epa.gov/opa/admpress.nsf/3881d73f4d4aaa0b85257359003f5348/46b167e60dac2c2185257677005bf4fa!OpenDocument>

Marine Environment

²⁵¹ UN Treaty on Maritime Goods Transportation Opened for Signature

Military Implications:

The military and its contractors should see how the new Rotterdam Rules influence their activities and be prepared to fully comply with the new regulation.

Sources:

United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea - the "Rotterdam Rules"

http://www.uncitral.org/uncitral/en/uncitral_texts/transport_goods/2008rotterdam_rules.html

Rotterdam Rules Gain Momentum as 20th State Signs

<http://www.unis.unvienna.org/unis/pressrels/2009/unis1133.html>

The Rotterdam Rules. Wide Support by States at Signing Ceremony in Rotterdam

https://www.bimco.org/Corporate%20Area/About/Press/Press_Releases/2009_09_23%20The%20Rotterdam%20Rules.aspx

²⁵² Work Plan for Reducing Greenhouse Gas Emissions from Ships

Military Implications:

[Similar to previous on this issue] Although emissions from military ships make up only a tiny fraction of this polluting source, the Navy should be prepared for new international anti-pollution regulations that may not exempt military craft. The Army's small fleet and contractors' vessels could generate issues for Army compliance.

Sources:

IMO environment meeting issues technical and operational measures to address GHG emissions from ships

http://www.imo.org/Newsroom/mainframe.asp?topic_id=1773&doc_id=11579

Prevention of Air Pollution from Ships, Second IMO GHG Study 2009

http://www.imo.org/Environment/mainframe.asp?topic_id=1823

Climate targets for ships deferred (subscription required to access full article)

<http://www.nature.com/news/2009/090717/full/news.2009.704.html>

Chemicals and other Hazardous Compounds

²⁵⁴ Kiev Protocol to Aarhus Convention Enters into Force in October 2009

Military Implications:

Although the military is not specifically listed in “Annex I: Activities” covered by the Protocol, its contractors would qualify under various categories and therefore should respect the reporting clauses. Also, since the registers refer to inventories from industrial as well as other sources, it is likely that pending further instructions, some military activities might get included. The military should assess the difference in reporting under the Kiev Protocol and the U.S. Toxics Release Inventory, and ensure that units stationed in Europe and their contractors appropriately comply with the new Protocol’s requirements.

Sources:

Kiev Protocol on Pollutant Release and Transfer Registers

<http://www.unece.org/env/pp/prtr.htm>

New International treaty requires industries to report on pollutants

http://www.unece.org/press/pr2009/09env_p17e.htm

Toxics Release Inventory Program

<http://www.epa.gov/TRI/>

²⁵⁵ Two New Pesticides Added to the Rotterdam Convention on the Prior Informed Consent (PIC) Watch List

Military implications:

Although the inclusion is not a ban, exporting nations should ensure prior consent of the recipient country. There are currently 29 pesticides and 11 industrial chemicals on the Rotterdam Convention’s watch list. Relevant personnel should ensure compliance with the PIC requirements during trans-border movement of the respective substances.

Sources:

New Chemicals Recommended for Listing Under the Rotterdam Convention

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=617&ArticleID=6503&l=en>

²⁵⁶ EU Restrictions on Nanofoods Expected to Pass in July*Military Implications:*

This action by the EU should serve as a further warning to the military to expect nanotech product restrictions to be enacted in jurisdictions worldwide, and to be prepared to adjust procurement plans accordingly.

Source:

U.S. should follow Europe and put the brakes on nanotech food and other products

<http://www.grist.org/article/food-opinion-US-should-follow-Europe-and-put-the-brakes-on-nanotech-food>

²⁵⁷ International Renewable Energy Agency Statute Enters into Force on 8 July 2010*Military Implications:*

[Same as previous on this issue] Military personnel seeking to implement the Army Strategy for the Environment and others responsible to further convert to renewable energy systems should explore potential relations with IRENA. Although its mandate is primarily consulting on renewable energy technology, it is reasonable to assume that IRENA will also address policy and regulatory issue for global energy security.

Source:

IRENA's statute enters into force

http://www.irena.org/news/Description.aspx?News_ID=19&mnu=nws

²⁵⁸ EPA Proposes Tougher Air-Quality Rules*Military Implications:*

The military should review how the new standards affect its activities and take adequate measures to reduce smog-forming pollutants. Note also that trees and other vegetation are significant elements of security screening and of training range realism and represent investments to be protected on military installations.

Sources:

EPA pushes tougher air-quality rules

<http://thehill.com/blogs/e2-wire/677-e2-wire/74733-epa-proposing-tougher-smog-standards>

EPA Strengthens Smog Standard/Proposed standards, strictest to date, will protect the health of all Americans, especially children

<http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/d70b9c433c46faa3852576a40058b1d4!OpenDocument>

E.P.A. Seeks Stricter Rules to Curb Smog

<http://www.nytimes.com/2010/01/08/science/earth/08smog.html?th&emc=th>

²⁵⁹ Waste Reduction and Recycling Regulations and Laws Spreading Around the World*Military Implications:*

The military should increase efforts for waste reduction and recycling, and comply or be prepared to comply with existing or future more stringent regulations.

Sources:

Draft National Waste Policy Framework - less waste more resources

<http://www.environment.gov.au/wastepolicy/consultation/index.html>

S.F. OKs toughest recycling law in U.S.

<http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/06/10/MN09183NV8.DTL>

²⁶⁰ **India Further Loosens Already Lax Rules on Waste Importing**

Military Implications:

Considering the often uncertain sources and nature of wastes, military personnel in India and surrounding areas might consider extra precautions. Potential new hazardous waste loads could reduce environmental viability for life support, increasing the likelihood of conflicts. Future military-to-military programs might include means to monitor these new potential pollution impacts.

Sources:

Is India a global trash can?

<http://timesofindia.indiatimes.com/india/Is-India-a-global-trash-can-/articleshow/5851954.cms>

Got hazardous waste? Send it to India

<http://www.livemint.com/2010/04/25233450/Got-hazardous-waste-Send-it-t.html>

PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES

Water

²⁶³ **Increased Protection Needed for the Marine Environment**

Military implications:

Military in the region should consider military-to-military capacity building and assisting local communities and authorities to adopt more systematic and integrated approaches to managing coastal and marine issues, including improved data collection and management. Military contractors might also be requested to participate in environmental protection efforts.

Sources:

East Asia's economy could suffer if seas are not protected, says UN report

<http://www.un.org/apps/news/story.asp?NewsID=33829&Cr=unep&Cr1>

Oceans' acidity rate is soaring, claims study

<http://www.independent.co.uk/environment/nature/oceans-acidity-rate-is-soaring-claims-study-1899536.html>

World's coral reefs could disintegrate by 2100

<http://www.guardian.co.uk/environment/2010/feb/23/worlds-coral-reefs-disintegrate-2100>

²⁶⁴ Proliferation of Sensors in and on Oceans Requires an International Legal Framework, but Might Affect Freedom to Conduct Ocean Research

Military Implications:

Since scientific research related to environmental early warning and conditions is intrinsic to security, the military should liaise with those developing international frameworks for regulating research instruments deployed on the high seas and be alert to potential sovereignty issues that might arise from the deployment of its own monitoring devices.

Sources:

Climate Change and Guidelines for Argo Profiling Float Deployment on the High Seas

<http://www.asil.org/insights100408.cfm>

IOC/EC-XLIII 43rd Session of IOC Executive Council, 8 - 16 June 2010, Paris, France

http://www.ioc-unesco.org/index.php?option=com_oe&task=viewEventRecord&eventID=521

²⁶⁵ Better Planning Needed for Maritime, Especially Coastal, Areas

Military Implications:

Military organizations with maritime responsibilities should be continuously monitoring the effects of their operations on the marine environment, especially along coasts, and should be prepared to cooperate with local and national agencies worldwide that are likely to increase their scrutiny of the health of the environment of these areas.

Sources:

NOAA chief says new ocean uses creating conflicts

<http://www.physorg.com/news167373736.html>

Scientists Map West Coast Areas Most Affected by Humans

<http://www.ia.ucsb.edu/pa/display.aspx?pkey=2009>

²⁶⁶ Factors to Consider in Establishing and Operating Marine Protected Areas

Military Implications:

The military should consider these principles in international, regional, and national planning and operations in marine protected areas. It should also be prepared to comply with new restrictions as marine protected areas expand.

Source:

Placement of marine reserves is key. Focusing on the heaviest-fished areas can help meet conservation goals

http://www.sciencenews.org/view/generic/id/56511/title/Placement_of_marine_reserves_is_key

²⁶⁷ EPA Plan for Reducing Ship Emissions

Military Implications:

[Similar to previous on this issue] The military should be prepared to comply with new international anti-pollution regulations that may not exempt military craft. Transportation contract managers will need to prepare for these changes, with respect to bidder selection.

Sources:

EPA Cracks Down on Ship Emissions

<http://www.thegreenitreview.com/2009/07/epa-cracks-down-on-ship-emissions.html>

Regulators cracking down on ship emissions

http://www.pressetelegram.com/news/ci_12846903

Biological Diversity

²⁶⁹ International Body to Monitor Biodiversity Destruction

Military Implications:

The military should be prepared to comply with potential new requirements and reporting, as well as new measures for protecting biodiversity.

Sources:

Governments Give Green Light to International Body on Biodiversity

<http://ictsd.org/i/news/biores/77860/>

Summary of the third ad hoc intergovernmental and multi-stakeholder meeting on an intergovernmental science-policy platform on biodiversity and ecosystem services 7-11 June 2010

<http://www.iisd.ca/ymb/biodiv/ipbes3/html/ymbvol1158num11e.html>

Integrated Solutions for Biodiversity, Climate Change and Poverty--UNEP Press Release:

<http://www.unep.org/ecosystemmanagement/Policy/UNEPOLICYSERIESBLOG/tabid/4564/language/en-US/Default.aspx>

Integrated Solutions for Biodiversity, Climate Change and Poverty--The Policy Brief

http://www.unep.org/policyseries/Sustainable_integrated_Solutions.pdf

²⁷⁰ New Measures to Continue the Fight against Biodiversity Loss

Military implications:

Personnel with environmental responsibilities, particularly regarding training, land management, and border control in affected regions, should review and update monitoring and inspection protocols to prevent harm to and illegal trafficking of newly regulated species.

Source:

More terrestrial fauna placed under CITES

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=617&ArticleID=6506&l=en>

'We failed' on species extinction, admits EU

<http://euobserver.com/9/29685/?rk=1>

²⁷¹ **Recommendations for Strengthening the Convention on Biological Diversity**

Military implications:

Personnel with environmental responsibilities, particularly regarding training and land management, should review and update monitoring and inspection protocols in the new CBD recommendations to prevent harm to biodiversity in general and endangered species specifically.

Source:

Summary of the Third Meeting of the Ad Hoc Open-Ended Working Group on Review of Implementation of the Convention on Biological Diversity

<http://www.iisd.ca/biodiv/wgri3/>

²⁷² **International Year of Biodiversity is 2010 and Convention on Biological Diversity COP10 to Meet in Japan This Year**

Military Implications:

In preparation for the COP10 of the CBD, it is likely that some new framework and regulations will be set to expand and better enforce the treaty. The military and its contractors should be prepared to comply with potential new regulations.

Sources:

2010 UN Year of Biodiversity

<http://www.cbd.int/2010/welcome/>

UN opens Biodiversity Year with plea to save world's ecosystems

<http://www.un.org/apps/news/story.asp?NewsID=33393&Cr=environment&Cr1=>

Benn to call on world leaders to adopt biodiversity pricing

<http://www.guardian.co.uk/science/2010/jan/25/hilary-benn-biodiversity-pricing>

Reformed Common Agricultural Policy should incentivise biodiversity

<http://www.greenwisebusiness.co.uk/news/reformed-common-agricultural-policy-should-incentivise-biodiversity-1102.aspx>

²⁷³ **Scientists Say Dolphins Should Be Treated As 'Non-Human Persons'**

Military Implications:

Declaring dolphins as “non-human persons” (or even a sustained claim of it) might give them new “rights.” Legislation concerning sonar and other activities that could cause ocean pollution and harm dolphins might be applied more severely.

Source:

Scientists say dolphins should be treated as 'non-human persons'

<http://www.timesonline.co.uk/tol/news/science/article6973994.ece>

Chemical and Biological Safety

²⁷⁵ First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination

Military Implications:

It is likely that coordination and synergies identification among the three Conventions will lead to some new directives and better enforcement measures. The military and its contractors should follow the process in order to be prepared to comply with the new requirements in the nations Party to the treaties. Note: the U.S. is not Party, but signatory of all three Conventions.

Source:

Simultaneous Extraordinary Meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions

<http://excops.unep.ch/>

Basel Convention National reporting

<http://www.basel.int/natreporting/index.html> (direct link to the Guidance Document on Improving National Reporting by Parties to the Basel Convention:

<http://www.basel.int/natreporting/GuidFinal-22102009.doc>)

²⁷⁶ First Joint Meeting of the Main Conventions on Hazardous Chemicals to Improve International Environmental Governance

Military Implications:

The joint meeting of Conferences of the Parties of three separate conventions represents a turning point in improving international environmental governance and accountability. Relevant military personnel should assess the synergies among different treaties and ensure that their respective monitoring activities are synchronized accordingly.

Sources:

UN launches global campaign to strengthen synergies in chemicals and waste management

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=612&ArticleID=6466&l=en&t=long>

Simultaneous Extraordinary Meeting of the Conferences of the Parties to the Basel, Rotterdam, and Stockholm Conventions (ExCOPs), and Eleventh Special Session of the UN Environment Programme (UNEP) Governing Council/ Global Ministerial Environment Forum (GCSS-11/GMEF) <http://www.iisd.ca/unepgc/unepss11/>

²⁷⁷ Preparations for a Legally Binding Global Instrument on Mercury Advance

Military Implications:

The military should assess which areas would be affected by a global ban on mercury and prepare for substitutes.

Sources:

First Session of the Intergovernmental Negotiating Committee to Prepare a Global Legally Binding Instrument on Mercury (INC1)

<http://www.iisd.ca/mercury/inc1/>

278 Biosafety Protocol Advances*Military Implications:*

The supplementary protocol is another example attesting to the trend of increased attention to liability and redress in the international arena. Although the U.S. is not Party and did not sign the Cartagena Protocol, and LMOs are not directly linked to military activity, relevant military personnel should attempt to respect, if not precisely follow, the language and terminology that will be included in the supplementary protocol to ensure that U.S. military activities and those of its contractors will not contravene the Protocol's requirements when acting in host Countries Party.

Sources:

Summary of the Second Meeting of the Group of Friends of the Co-Chairs on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, 8–12 February 2010

<http://www.iisd.ca/vol09/enb09495e.html>

COP-MOP 5

<http://www.cbd.int/mop5/>

UNEP Year Book 2010

<http://www.unep.org/yearbook/2010>

279 Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons*Military Implications:*

Relevant military personnel should review the results of the August meetings and consider making recommendations for the upcoming December meeting. Recommendations should increase collaboration with counterparts to improve internationally harmonized bio-control and response systems and the use of bio-nanosensor networks (some of which have been referenced in these monthly reports.)

Sources:

Biological Weapons Convention Expert Meeting Concludes

[http://www.unog.ch/80256EDD006B9C2E/\(httpNewsByYear_en\)/CE96DCFC346B580DC1257620004DAC6F?OpenDocument](http://www.unog.ch/80256EDD006B9C2E/(httpNewsByYear_en)/CE96DCFC346B580DC1257620004DAC6F?OpenDocument)

Biodefense Research Could Violate Weapons Conventions, Report Warns

http://gsn.nti.org/gsn/nw_20090820_6796.php

New approaches to biological risk assessment

<http://royalsociety.org/document.asp?tip=0&id=8700>

White House, Scientists Discuss Biological Threats

http://gsn.nti.org/gsn/ts_20090828_3718.php

280 No Enforcement Mechanism Proposed for Strengthening the Bioweapons Treaty Due to “rapidly changing nature” of the threat*Military Implications:*

Given the “rapidly changing nature of the biological weapons threat”, the military should explore new approaches for monitoring and enforcement of the BWC. In the absence of an adequate

monitoring systems framework, relevant military personnel should increase collaboration with counterparts to improve internationally harmonized bio-control and response systems and the use of bio-nanosensor networks (some of which have been referenced in these monthly reports.)

Sources:

President Obama Releases National Strategy for Countering Biological Threats

<http://www.whitehouse.gov/the-press-office/president-obama-releases-national-strategy-countering-biological-threats>

National Strategy for Countering Biological Threats

http://www.whitehouse.gov/sites/default/files/National_Strategy_for_Countering_BioThreats.pdf

U.S. Announces New Strategy for Biological Weapons Convention

http://gsn.nti.org/gsn/nw_20091209_8157.php

Biological Weapons Convention Meeting of States Parties Concludes in Geneva

[http://www.unog.ch/80256EDD006B9C2E/\(httpNewsByYear_en\)/77D5F2659E3558E5C125768C00324E30?OpenDocument](http://www.unog.ch/80256EDD006B9C2E/(httpNewsByYear_en)/77D5F2659E3558E5C125768C00324E30?OpenDocument)

Biological Weapons Convention, Meeting of States Parties (7-11 December 2009)

[http://www.unog.ch/_80256ee600585943.nsf/\(httpPages\)/f1cd974a1fde4794c125731a0037d96d?OpenDocument&ExpandSection=10#_Section10](http://www.unog.ch/_80256ee600585943.nsf/(httpPages)/f1cd974a1fde4794c125731a0037d96d?OpenDocument&ExpandSection=10#_Section10)

US wants tough bioweapons ban, but no verification

http://www.google.com/hostednews/ap/article/ALeqM5jGwVYFyDmzsqoU9U3_k53Y9TSVggD9CFTEI01

²⁸¹ **Chemicals Management to Address Emerging Technologies-related Issues**

Military Implications:

Relevant military personnel should follow the work of SAICM both for collaboration and preparedness for eventual new regulations.

Sources:

Emerging policy issues - ICCM2 outcomes and follow-up

<http://www.saicm.org/index.php?menuid=9&pageid=392&submenuheader=>

Update on SAICM implementation – emerging policy issues. 2 September 2009

<http://www.saicm.org/documents/iccm/ICCM2/September09%20update-rev%20on%20emerging%20issues.pdf>

²⁸² **International Gene Synthesis Consortium Created for Increasing Biosecurity**

Military Implications

Military personnel concerned with biosecurity and contractors working in gene synthesis should consider actively participating in these organizations and observe the protocols and codes of conduct of the industry, as well as offering guidance for further improving biosecurity.

Sources:

World's Top Gene Synthesis Companies Establish Tough Biosecurity Screening Protocol

http://www.genesynthesisconsortium.org/November_19.html

Gene Synthesis Companies Pledge to Foil Bioterrorists

<http://blogs.sciencemag.org/scienceinsider/2009/11/gene-synthesis.html>

Code of Conduct for Best Practices in Gene Synthesis

<http://www.ia-sb.eu/go/synthetic-biology/activities/press-area/press-information/code-of-conduct-for-best-practices-in-gene-synthesis/>

Symposium on Future Challenges of International Law: the Way Forward in Patenting Biotechnology

http://www.wipo.int/meetings/en/2009/wipo_ls_biot_ge_09/

²⁸³ **Insecticide Ingredient Deet May Be a Neurotoxin**

Military Implications:

Until the toxicity questions are settled, caution should be exercised in using products containing this compound; in particular the recommendations from the EPA's Fact Sheet on deet should be followed.

Sources:

The Insect Repellent DEET

<http://www.epa.gov/opp00001/factsheets/chemicals/deet.htm>

Popular Insect Repellent Deet Is Neurotoxic

<http://www.sciencedaily.com/releases/2009/08/090804193230.htm>

²⁸⁴ **New Evidence on Silver Toxicity**

Military Implications:

The military should evaluate this study and the use of silver, especially silver nanoparticles, in materiel, in the light of these and future findings in this research.

Sources:

Silver Impairs Neurodevelopment: Studies in PC12 Cells

<http://ehp.niehs.nih.gov/members/2009/0901149/0901149.pdf>

Silver is a potent nerve cell toxicant

<http://www.environmentalhealthnews.org/ehs/newscience/silver-is-potent-neurotoxicant/>

²⁸⁵ **The EU's Chemical Regulatory Regime might be adjusted to Include Nanomaterials**

Military Implications:

Relevant military personnel and contractors to the military should follow the work on these projects for new insights into potential nanotech-related risks and related regulations, as well as for assessing potential implications of eventual changes to the REACH system.

Sources:

Consortium awarded crucial advisory contracts on the regulation of nanomaterials under REACH

http://www.nanowerk.com/news/newsid=14573.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Consultancy & Review Activities - EC & SAFENANO

<http://www.safenano.org/REACHnanoInfo.aspx>

REACH-NanoHazEx: Rip-oN 3

<http://www.safenano.org/REACHnanoHazEx.aspx>

Nanomaterials under REACH report

<http://www.rivm.nl/bibliotheek/rapporten/601780003.pdf>

Nanomaterials under REACH: Some Adjustments Needed

<http://www.innovationsgesellschaft.ch/index.php?section=news&cmd=details&newsid=274&teaserId=>

²⁸⁶ Comments Solicited on Proposed UN Nanotech Safety Report

Military Implications:

Military personnel concerned with nanotech safety policy should consider commenting on the proposed report.

Sources:

Report on Nanotechnologies and Manufactured Nanomaterials

<http://www.merid.org/nanodev/more.php?articleID=2481&search=%2Fnanodev%2Farchive.php%3FdoSearch%3D1%26items%3D20%26q%3DSAICM%26sortField%3DPosted%26submit%3DSearch&scorePrecent=73>

Nanotechnology and manufactured nanomaterials (resolution II/4 E) (report request)

<http://www.saicm.org/index.php?menuid=9&pageid=425&submenuheader=>

²⁸⁷ **Asian Countries to Adapt their Chemicals Regulatory Systems to EU REACH System**

Military implications:

Military personnel in the region with environmental responsibilities should review these policy changes, update the database of restricted and banned chemicals, and actively seek environmentally safer substitutes. It is fair to speculate that the three Asian countries' alignment with the REACH system will be emulated by other countries and regions around the world.

Source:

Park, DaeYoung: REACHing Asia Continued (September 16, 2009)

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1474504

²⁸⁸ **U.S. to Revise the Toxic Substances Control Act**

Military implications:

Personnel with environmental and safety responsibilities should monitor this debate and anticipate how it might affect the prioritization and changes to the list of toxic and regulated substances; and hence, new requirements to seek substitutes for these chemicals.

Sources:

Experts debate ways to reform 1976 toxics law

<http://www.nytimes.com/gwire/2009/10/07/07greenwire-experts-debate-ways-to-reform-1976-toxics-law-83495.html>

Revisiting the Toxic Substances Control Act of 1976

<http://www.nanotechproject.org/news/archive/7092/>

Summary of the Toxic Substances Control Act

<http://www.epa.gov/lawsregs/laws/tsca.html>

²⁸⁹ **Toxic Substances Control Act Up for Revision**

Military Implications:

The military should follow the legislative course of this measure for possible effects on military procurement.

Source:

Taking the NanoPulse -- Toxic Substance Meets Poison Thinking

http://www.industryweek.com/articles/taking_the_nanopulse_-_toxic_substance_meets_poison_thinking_22034.aspx?Page=2?ShowAll=1

²⁹⁰ **U.S. New Measures on Chemicals Safety**

Military Implications:

As the military reviews its usage of chemicals, it should note where it should be prepared to comply with the new measures and look into safe replacements where possible. When researching novel alternative materials, priority should be given to technologies for which the associated potential risks were thoroughly investigated. Also, transport and disposal protocols of hazardous chemicals should include the necessary precautions to minimize exposure.

Sources:

EPA Announces Actions to Address Chemicals of Concern, Including Phthalates: Agency continues efforts to work for comprehensive reform of toxic substance laws

<http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/2852c60dc0f65c688525769c0068b219!OpenDocument>

Existing Chemicals Action Plans

<http://www.epa.gov/oppt/existingchemicals/pubs/ecactionpln.html>

Stricter rules urged on toxic chemicals

<http://www.post-gazette.com/pg/10022/1030212-114.stm>

²⁹¹ **California Proposes Reducing the Level of Chromium 6 in Water**

Military Implications:

The military should consider these new limits in carrying out environmental risk assessments for drinking water.

Sources:

California unveils new goal for controversial carcinogen in water

<http://www.environmentalhealthnews.org/ehs/news/chromium-6-goal>

Public Health Goal for Hexavalent Chromium in Drinking Water (Draft). Office of Environmental Health Hazard Assessment California Environmental Protection Agency

<http://www.oehha.ca.gov/water/phg/pdf/Cr6PHGdraft082009.pdf>

292 Toxic Compound Detected in Chlorinated Tap Water*Military Implications:*

The military should follow this and related research to determine if changes are necessary in water treatment methods.

Sources:

A Toxic Disinfection By-product, 2,6-Dichloro-1,4-benzoquinone, Identified in Drinking Water

<http://www3.interscience.wiley.com/journal/123218235/abstract>

Tracing the traces: Nanogram concentrations of a toxic compound detected in chlorinated tap water

<http://www.physorg.com/news180767147.html>

293 Environmental Effects from Flame Retardant Manufacturing Impurities*Military Implications:*

In the analysis of environmental hazards, the military needs to take into account not only a principal polluting agent, such as Dechlorane Plus in this case, but also this indirect kind of source for the presence of other chemical pollutants.

Source:

Flame retardants are the suspected source of a new compound in the environment

<http://pubs.acs.org/doi/full/10.1021/es903688s>

294 Ultrathin Solar Panels Could End Up On the EU list of Hazardous Materials, Due to Cadmium Content*Military implications:*

The military and its contractors should be cautious with procurements of ultrathin photovoltaic panels in case that they might be recalled or might involve complicated waste disposal procedures. R&D on substitution alternatives for cadmium telluride should be considered for cadmium ultrathin photovoltaics.

Source:

Balancing energy needs and material hazards

<http://www.nytimes.com/2009/11/09/business/energy-environment/09iht-green09.html>

295 Increasing Advocacy for BPA Restrictions*Military Implications:*

The military should review the adequacy of its logistical provisions for the possible future ban or restriction of products containing BPA. Also, as a precaution, it should consider reducing the use of BPA-containing products.

Source:

A group of 60 scientists backed by environmental, health

<http://www.independent.co.uk/news/science/use-of-bpa-must-be-limited-say-scientists-2007841.html>

French lawmakers ban baby bottle chemical
<http://www.physorg.com/news196513736.html>

²⁹⁶ **Building Contaminants Linked to Parking Lots with Coal Tar Sealant**

Military Implications:

The military should investigate these findings to determine if they require changes in construction and maintenance practices for military installations.

Sources:

Parking Lot Problems

http://www.enn.com/top_stories/article/40920

Contaminated House Dust Linked to Parking Lots with Coal Tar Sealant

<http://www.sciencedaily.com/releases/2010/01/100113112056.htm>

Coal-Tar-Based Parking Lot Sealcoat: An Unrecognized Source of PAH to Settled House Dust

<http://pubs.acs.org/doi/abs/10.1021/es902533r>

²⁹⁷ **Organophosphate Flame Retardants May Pose Health Risk**

Military Implications:

The military should follow investigations of this possible problem, and, if appropriate, begin preparing for restrictions on the use of organophosphate flame retardants in materiel.

Source:

Dust harbors new fire retardants associated with hormone, sperm changes

<http://www.environmentalhealthnews.org/ehs/newscience/op-fire-retardants-in-dust-linked-to-hormone-sperm-changes/>

House Dust Concentrations of Organophosphate Flame Retardants in Relation to Hormone Levels and Semen Quality Parameters

<http://ehp.niehs.nih.gov/docs/2009/0901332/abstract.html>

GREENHOUSE GAS EMISSIONS

²⁹⁹ **Post-Copenhagen Negotiations**

Military Implications:

[Same to all on this issue] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

*Sources:*³⁰⁰ **June 2010**

Summary of the Bonn Climate Change Talks: 31 May - 11 June 2010

<http://www.iisd.ca/download/pdf/enb12472e.pdf>

Summary of the Bonn Climate Change Talks 31 May - 11 June 2010

<http://www.iisd.ca/vol12/enb12472e.html>

Critics slam new climate change proposal in Bonn

<http://www.google.com/hostednews/ap/article/ALeqM5i9TuMrvrknh-ZXwqmZ2N-48kff3wD9G98TK01>

Rage, Dismay, and Disappointment as Climate Meeting Comes to a Close

<http://ictsd.org/i/news/biores/77872/>

Report of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol on its twelfth session, held in Bonn from 1 to 11 June 2010

http://unfccc.int/documentation/documents/advanced_search/items/3594.php?such=j&last_days=60&dat_no=j#beg

Energy Subsidies: Getting the Prices Right

http://www.iea.org/files/energy_subsidies.pdf

³⁰¹ **May 2010**

Climate Talks Open in Bonn

<http://www.iisd.ca/climate/sb32/>

Under Current Policies

<http://www.eia.doe.gov/neic/press/press343.html>

Energy use set to jump 50 percent by 2035: report

http://www.energy-daily.com/reports/Energy_use_set_to_jump_50_percent_by_2035_report_999.html

Global CO2 Emissions To Rise 43 Percent By 2035: EIA

<http://planetark.org/enviro-news/item/58178>

³⁰² **April 2010**

Climate change negotiators agree on intensified UNFCCC negotiating schedule for 2010

http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/101104_pr_awg_april.pdf

UNFCCC Parties Agree on Additional Meeting Sessions Before COP 16

<http://climate-1.org/2010/04/12/unfccc-parties-agree-on-additional-meeting-sessions-before-cop-16/>

US denies climate aid to countries opposing Copenhagen accord

<http://www.guardian.co.uk/environment/2010/apr/09/us-climate-aid>

³⁰³ March 2010

India and China to be Listed in Chapeau of Copenhagen Accord

<http://climate-l.org/2010/03/10/india-and-china-to-be-listed-in-chapeau-of-copenhagen-accord/>

China and India join Copenhagen accord

<http://www.guardian.co.uk/environment/2010/mar/09/china-india-copenhagen-accord>

China's letter to the UNFCCC

http://unfccc.int/files/meetings/application/pdf/china_090310.pdf

India's letter to the UNFCCC

<http://unfccc.int/files/meetings/application/pdf/indiacphaccord.pdf>

³⁰⁴ February 2010

UN says nations' greenhouse gas pledges too little

http://www.forbes.com/feeds/ap/2010/02/01/general-un-un-climate_7319309.html?boxes=Homepagebusinessnews

UNFCCC receives list of government climate pledges (Press Release)

http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/pr_accord_100201.pdf

Appendix I - Quantified economy-wide emissions targets for 2020

<http://unfccc.int/home/items/5264.php>

Appendix II - Nationally appropriate mitigation actions of developing country Parties

<http://unfccc.int/home/items/5265.php>

Bonn to host extra U.N. climate talks, treaty unsure

<http://in.reuters.com/article/environmentNews/idINTRE61L3XW20100222?sp=true>

The Climate Scoreboard

<http://climateinteractive.org/scoreboard>

Current Climate Proposals

<http://climateinteractive.org/scoreboard/scoreboard-science-and-data/current-climate-proposals-1/current-climate-proposals>

Greater efforts needed to curb global warming – UN report

[http://www.un.org/apps/news/story.asp?NewsID=33859&Cr=unep&Cr1=](http://www.un.org/apps/news/story.asp?NewsID=33859&Cr=unep&Cr1=INFORMATION NOTE How Close Are We to the Two Degree Limit?)

INFORMATION NOTE How Close Are We to the Two Degree Limit?

<http://www.unep.org/PDF/PressReleases/temperature-briefing-21-02-10-final-e.pdf>

More Ambition Needed if Greenhouse Gases are to Peak in Time, Says New UNEP Report

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=612&ArticleID=6472&l=en>

INFORMATION NOTE How Close Are We to the Two Degree Limit? UNEP Governing

Council Meeting & Global Ministerial Environment Forum 24-26 February, 2010 Bali,

Indonesia

<http://www.unep.org/PDF/PressReleases/temperature-briefing-21-02-10-final-e.pdf>

³⁰⁵ January 2010

EU pushes for deeper carbon emissions cuts

<http://news.ph.msn.com/top-stories/article.aspx?cp-documentid=3793552>

EU climate offer unchanged

<http://euobserver.com/9/29357/?rk=1>

The Copenhagen Conference: How Should the EU Respond?

<http://www.iiea.com/publications/the-copenhagen-conference-how-should-the-eu-respond>

Australia to put forward unchanged carbon cuts to UN

http://www.terradaily.com/reports/Australia_to_put_forward_unchanged_carbon_cuts_to_UN_999.html

Copenhagen & beyond: Stage set for BASIC meet in Delhi

<http://economictimes.indiatimes.com/news/politics/nation/Copenhagen-beyond-Stage-set-for-BASIC-meet-in-Delhi/articleshow/5486475.cms>

China-led group to meet ahead of climate deadline

<http://www.alertnet.org/thenews/newsdesk/SGE60C06X.htm>

China, 3 others to chart climate roadmap

http://www.chinadaily.com.cn/world/2010-01/15/content_9324199.htm

³⁰⁶ **“Copenhagen Accord” Brokered by President Obama at UN Climate Change Conference Is a Step Forward in Negotiations—Next Stop Mexico**

Military Implications:

The military should produce a plan with special attention to AFRICOM to respond to the third point of the Copenhagen Accord brokered by President Obama that calls for... “Enhanced action and international cooperation on adaptation...and building resilience in developing countries...especially...Africa. Relevant military personnel should review the documents of the Copenhagen Conference to identify opportunities for implementing the Army Strategy for the Environment, military-to-military activities to build adaptation capacities, and other military and their contractors’ responsibilities to implement the Copenhagen Accord around the world.

Sources:

Copenhagen Accord. Draft decision -/CP.15 Proposal by the President. Conference of the Parties, Fifteenth session, Copenhagen, 7-18 December 2009

<http://unfccc.int/resource/docs/2009/cop15/eng/107.pdf>

Summary of the Copenhagen Climate Change Conference

<http://www.iisd.ca/vol12/enb12459e.html>

The Copenhagen climate change summit. New Scientist's full coverage

<http://www.newscientist.com/special/copenhagen-climate-change-summit>

Post-Kyoto Protocol Negotiations

Military Implications:

[Same to all on this issue] Increasingly more compelling evidence and warnings on climate change amplify international discourse and increase the emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects. Hence, the military should be doing its part in reducing greenhouse gas emissions and preparing to help mitigate the human-made and natural catastrophes that could ensue.

Sources:

308 November 2009

Barcelona Climate Change Talks 2009

http://unfccc.int/meetings/intersessional/barcelona_09/items/5024.php

Summary of the Barcelona Climate Change Talks, 2-6 November 2009

<http://www.iisd.ca/vol12/enb12447e.html>

Not a climate treaty, but political deal possible

<http://news.moneycentral.msn.com/provider/providerarticle.aspx?feed=AP&date=20091116&id=10677838>

Hopes rise for climate talks as rich countries ante up

<http://www.france24.com/en/node/4935560>

UK's Brown backs \$10 billion climate change fund

<http://www.reuters.com/article/latestCrisis/idUSGEE5AQ1KN>

African "Committee of Ten" Discusses Strategy for Copenhagen

<http://climate-l.org/2009/11/18/african-%E2%80%9Ccommittee-of-ten%E2%80%9D-discusses-strategy-for-copenhagen/>

Obama to Go to Copenhagen With Emissions Target

http://www.nytimes.com/2009/11/26/us/politics/26climate.html?_r=1&th&emc=th

China to dramatically slow emissions growth

http://news.yahoo.com/s/ap/20091126/ap_on_re_as/climate

309 October 2009

Summary of the Bangkok Climate Change Talks: 28 September - 9 October 2009

<http://www.iisd.ca/download/pdf/enb12439e.pdf>

UN climate talks split on treaty

<http://news.bbc.co.uk/2/hi/science/nature/8298553.stm>

Documentation to facilitate negotiations amongst Parties: Note by the Chair

<http://climate-l.org/2009/10/26/unfccc-secretariat-releases-awg-kp-documentation-to-facilitate-negotiations/>

Backers of UN climate treaty look to 2010 for deal

<http://www.reuters.com/article/environmentNews/idUSTRE59Q2TG20091027>

Europe offers to cut emissions 95% by 2050 if deal reached at Copenhagen

<http://www.guardian.co.uk/environment/2009/oct/21/europe-carbon-emissions>

Sen. Boxer to move ahead on climate bill

<http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE59Q0JY20091029>

Africans demand voice in climate change meeting

<http://www.businessdailyafrica.com/Company%20Industry/-/539550/673832/-/view/printVersion/-/12pxh56z/-/index.html>

African countries will speak with one voice at Copenhagen climate summit: AU chief

http://news.xinhuanet.com/english/2009-10/12/content_12218664.htm

310 September 2009

UN Secretary-General's speech: <http://www.un.org/News/Press/docs/2009/sgsm12464.doc.htm>

Climate change declaration:

<http://www.sidsnet.org/aosis/documents/AOSIS%20Summit%20Declaration%20Sept%2021%20FINAL.pdf>

Islands warn of extinction at UN climate week

<http://www.google.com/hostednews/afp/article/ALeqM5hXGjRwt2a9gBiK9pf1pxu-r3199Q>

G20 agrees on phase-out of fossil fuel subsidies

<http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE58O18U20090926?pageNumber=2&virtualBrandChannel=11604>

Sarkozy proposes extra climate summit ahead of Copenhagen

<http://euobserver.com/19/28705>

Nations Appear Headed Toward Independent Climate Goals

<http://www.washingtonpost.com/wp-dyn/content/article/2009/09/22/AR2009092201137.html>

Japan's Next Premier Vows to Cut Emissions Sharply

http://www.nytimes.com/2009/09/08/world/asia/08japan.html?_r=1

Japanese carbon cut may sweep away UN who-jumps-first obsession

<http://www.brisbanetimes.com.au/world/japanese-carbon-cut-may-sweep-away-un-whojumpsfirst-obsession-20090908-fe19.html>

China Changes The Climate Debate

<http://www.forbes.com/2009/09/02/china-climate-consumer-tax-opinions-columnists-robyn-meredith.html>

Widen global warming fight beyond CO2: U.N.

<http://www.reuters.com/article/GCA-GreenBusiness/idUSL449824520090904>

Bangkok Climate Change Talks – 2009

<http://www.iisd.ca/climate/ccwg7/>

³¹¹ August 2009

Summary of the Bonn Climate Change Talks

<http://www.iisd.ca/vol12/enb12427e.html>

Vulnerable states team up for tougher climate pact

<http://www.reuters.com/article/environmentNews/idUSTRE57D41F20090814>

India opposes financing proposal to contain greenhouse emissions

<http://www.livemint.com/2009/08/17220018/India-opposes-financing-propos.html>

China sets date for CO2 cut

http://www.ft.com/cms/s/0/cfc5d2fa-8933-11de-b50f-00144feabdc0.html?nclick_check=1

³¹² July 2009

G8 leaders 'ignored' UN's scientific findings on climate change, says official

<http://www.un.org/apps/news/story.asp?NewsID=31524&Cr=climate+change&Cr1>

Group of 8 Agrees On a Ceiling for Temperature Rise

<http://www.washingtonpost.com/wp-dyn/content/article/2009/07/08/AR2009070802635.html?hpid=moreheadlines>

Poorer Nations Reject a Target on Emission Cut

http://www.nytimes.com/2009/07/09/world/europe/09prexy.html?_r=1&ref=earth

U.S.-China Memorandum of Understanding to Enhance Cooperation on Climate Change, Energy and the Environment

<http://www.state.gov/r/pa/prs/ps/2009/july/126592.htm>

U.S. and China sign memorandum on climate change

<http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE56R4W320090728>

³¹³ **Reducing GHG Emissions Using the Montreal Protocol and other Regulatory Systems**

Military Implications:

This parallel strategy to the post-Kyoto Protocol approach could speed up the international regulatory response to climate change; hence, the military and its contractors should consider accelerating the work to phase out GHGs and find substitutes.

Sources:

Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO₂ emissions

<http://www.pnas.org/content/early/2009/10/19/0902568106.full.pdf+html>

Climate scientists suggest revisiting the 1987 Montreal Protocol

<http://www.canada.com/technology/Climate%20scientists%20suggest%20revisiting%201987%20Montreal%20Protocol/2103810/story.html>

Ozone protocol squares up to climate

<http://www.nature.com/news/2009/091028/full/4611184a.html>

³¹⁴ **New Decisions Adopted for Strengthening the Montreal Protocol**

Military Implications:

[Similar to previous on this issue] The military and its contractors should consider substitutes and promote the phaseout of ozone-depleting compounds.

Sources:

Documents of the 21st Meeting of the Parties to the Montreal Protocol, 4-8 November, 2009

http://ozone.unep.org/Meeting_Documents/mop/21mop/index.shtml

Twenty-first meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

<http://www.iisd.ca/ozone/mop21/>

³¹⁵ **Powerful Greenhouse Gas HFCs Might be banned under the Montreal Protocol**

Military Implications:

[Similar to previous implications on this issue] The military and its contractors should consider substitutes and promote the phaseout of these compounds, because increased research and new regulations are possible.

Source:

Ozone Treaty May Hold Key to Halting Climate Change

<http://www.ipsnews.net/news.asp?idnews=48211>

³¹⁶ North American Proposal to Phase Down HFC's*Military Implications:*

The military should find substitutes for HFC's in cooling systems.

Source:

Recent International Developments in Saving the Ozone Layer

<http://www.epa.gov/ozone/intpol/mpagreement.html>

³¹⁷ **Draft International Standards for Measuring Greenhouse Gas Emissions for Cities***Military Implications:*

Military organizations need to be aware of and familiar with the recent Executive Order 13514 and the CEQ-OMB Strategic Sustainability Performance Plan. The military among other federal agencies will be given instructions on calculating GHGs as part of their respective yearly reporting on progress in adhering to this EO. These directives should guide any discussions with international organizations and foreign governments regarding GHG reporting.

Sources:

Cities Get Common Standard for Measuring Greenhouse Gas Emissions

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=617&ArticleID=6508&l=en&t=long>

Draft International Standard for Determining Greenhouse Gas Emissions for Cities

http://www.unep.org/urban_environment/PDFs/InternationalStd-GHG.pdf

UN-HABITAT Annual Report

<http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2938>

Executive Order 13514—Federal Leadership in Environmental, Energy, and Economic Performance

<http://edocket.access.gpo.gov/2009/pdf/E9-24518.pdf>

³¹⁸ **EU Potential New Measures For Reducing CO₂ Emissions***Military Implications:*

Military stationed in EU member states should enhance their efforts to support EU CO₂ emissions reduction policy and seek opportunities to apply the Army Strategy for the Environment.

Sources:

EU mulls carbon tax to fight climate change

<http://english.cctv.com/20091003/102119.shtml>

Commission unveils van CO₂ emissions standards proposal

<http://euobserver.com/9/28904/?rk=1>

Europe Suggests Emissions Limits on Small Trucks

http://www.nytimes.com/2009/10/29/business/energy-environment/29vans.html?_r=1

319 France Proposes Carbon Tax Across EU and on Imports*Military Implications:*

It is not clear at this point if there would be any carbon tax exemptions for the military and its contractors. Military stationed in France (EU generally) and its contractors should intensify efforts to reduce their carbon footprint and be prepared for responding to new regulations and taxes.

Sources:

Paris wants pan-European carbon tax

<http://euobserver.com/9/29221/?rk=1>

The Coming Battles Over Green Trade - by Mac Margolis

<http://www.eu-digest.com/2010/01/coming-battles-over-green-trade-by-mac.html>

France to tax big polluters under revised scheme

<http://www.reuters.com/article/idUSTRE60J4FA20100120>

320 China and U.S. Announce Climate Change Goals*Military Implications:*

The military should accelerate its efforts to build military-to-military programs with China that focus on climate change. Potential cooperation might identify resources and programs for reducing GHGs and responding to effects of climate change. A joint information system for this cooperation should be created and updated continuously, to include forecasts for how both militaries might be called upon for mitigation and adaptation and performing joint gap analyses in anticipation of future adaptation requests, which might involve creating a coherent global security plan to address the accelerating threats of climate change.

Sources:

China announces carbon reduction targets

<http://english.cctv.com/program/bizchina/20091126/104112.shtml>

President to Attend Copenhagen Climate Talks

<http://www.whitehouse.gov/the-press-office/president-attend-copenhagen-climate-talks>

Big Developing Countries Form Climate Change Front

<http://planetark.org/wen/55688>

321 British Group Outlines Plan for Zero Emissions by 2030*Military Implications:*

Military personnel concerned with emission reduction policies and plans should review this plan for useful ideas.

Sources:

ZeroCarbonBritain2030

<http://www.zcb2030.org/>

Zero carbon Britain: how to get there in 10 steps

http://www.theecologist.co.uk/News/news_analysis/513525/zero_carbon_britain_how_to_get_there_in_10_steps.html

New Technologies

³²³ Report Suggests New Approach to Technology Assessment

Military Implications:

Military personnel concerned with the assessment of new environment-related technologies, and technology in general, should review this report for its ideas on improving the process.

Source:

Reinventing Technology Assessment: A 21st Century Model

http://www.wilsoncenter.org/index.cfm?topic_id=1414&fuseaction=topics.event_summary&event_id=605820

³²⁴ Geoengineering May Require International Environmental Regulations

Military Implications:

Since some geoengineering techniques might also be used as weapons, the military should be involved from the very beginning in the discussions and negotiations for drawing guidelines and regulations for testing, as well as use, of geoengineering technologies.

Sources:

A Search for Rules Before Climate-Changing Experiments Begin

<http://www.nytimes.com/cwire/2010/01/18/18climatewire-a-search-for-rules-before-climate-changing-e-40048.html>

Time to start researching global 'sun block': scientist

<http://www.lfpres.com/news/canada/2010/01/27/12637061.html>

Research on Global 'Sun Block' Needed Now, Experts Argue

<http://www.sciencedaily.com/releases/2010/01/100127134243.htm>

³²⁵ International Framework Needed to Address Governance Gap over Geoengineering

Military Implications:

Military personnel, who explore longer-range possibilities, should explore geoengineering techniques that could be weaponized and what international frameworks might prevent such abuse.

Source:

The Emperor's New Climate: Geoengineering as 21st century fairytale

http://www.etcgroup.org/en/materials/publications.html?pub_id=762

³²⁶ UK and US Legislators Review Geoengineering Proposals

Military Implications:

Military personnel should keep abreast of these efforts, including attending hearings and reviewing materials.

Sources:

Geoengineering Gets a Hearing in Congress -- and in the U.K., Too

<http://industry.bnet.com/energy/10002452/geoengineering-gets-a-congressional-hearing-and-the-uk-too/>

Geoengineering: Assessing the Implications of Large-Scale Climate Intervention

http://science.house.gov/publications/hearings_markup_details.aspx?newsid=2668

Ken Caldeira Testifies to Congress on Geoengineering

http://www.ciw.edu/news/ken_caldeira_testifies_congress_geoengineering

³²⁷ Royal Society Issues Major Geo-engineering Report

Military Implications:

[Same as previous on this issue] Military personnel who explore longer-range possibilities should explore geo-engineering techniques that could be weaponized and what international frameworks might prevent such abuse.

Sources:

Geoengineering the climate. Science, governance and uncertainty (September 2009)

<http://royalsociety.org/displaypagedoc.asp?id=35094>

Risky schemes may be only hope for cooling planet: scientists

<http://www.physorg.com/print171034934.html>

Nanotechnology

³²⁹ New Technology to Measure Single Nanoparticles

Military Implications:

In view of the recent results on the effect of nanoparticle size on toxicity, the military should ensure that possible use of this new tool receives proper attention in nanotech risk assessment.

Sources:

Tiny whispering gallery: Sensor can detect a single nanoparticle and take its measurement

<http://www.physorg.com/news180363327.html>

On-chip single nanoparticle detection and sizing by mode splitting in an ultrahigh-Q microresonator

<http://www.nature.com/nphoton/journal/vaop/ncurrent/abs/nphoton.2009.237.html> (Abstract)

³³⁰ New Inventory Lists More Than 1000 Nanoproducts

Military Implications:

Military personnel concerned with nanotech risk assessment should familiarize themselves with this resource, which has extensive search capabilities.

Sources:

Nano, nano everywhere. Not exactly, but we're working on it

<http://www.smartplanet.com/business/blog/business-brains/nano-nano-everywhere-not-exactly-but-were-working-on-it/2021/>

An inventory of nanotechnology-based consumer products currently on the market

<http://www.nanotechproject.org/inventories/consumer/>

³³¹ Global Archive of Government Nanotech Documents Launched

Military Implications:

Military personnel concerned with nanotech regulation should familiarize themselves with this resource.

Sources:

Welcome to the Nanotech Regulatory Document Archive

<http://nanotech.law.asu.edu/>

First global nanotechnology regulation database launched

http://www.nanowerk.com/news/newsid=13817.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³³² List of Experts in Nanotechnology Ethics Published

Military Implications:

Military personnel concerned with nanotech risk management should familiarize themselves with this resource.

Source:

Experts NanoEthics and Ethical, Legal and Social Aspects of Nanotechnology

<http://www.observatorynano.eu/project/document/2918/>

³³³ ObservatoryNANO 2nd Annual Report on Ethical and Societal Aspects of Nanotechnology

Military Implications:

Although the foci of the report are somewhat distant from military concerns, it should provide useful ideas on general nanotech ethics and regulatory policy

Sources:

ObservatoryNano 2nd Annual Report on Ethical and Societal Aspects of Nanotechnology

<http://www.merid.org/nanodev/more.php?articleID=2584>

Nanobioethics. ObservatoryNano 2nd Annual Report on Ethical and Societal Aspects of Nanotechnology

<http://www.observatorynano.eu/project/catalogue/4NB/>

³³⁴ Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies

Military Implications:

Military personnel concerned with nanotech regulation should consider attending one of these conferences.

Sources:

London:

<http://www2.lse.ac.uk/internationalRelations/centresandunits/regulatingnanotechnologies/nanohome.aspx>

Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies
http://www.wilsoncenter.org/index.cfm?fuseaction=events.event_summary&event_id=544514
Securing the Promise of Nanotechnologies: Towards Transatlantic Regulatory Cooperation
http://www.chathamhouse.org.uk/files/14692_r0909_nanotechnologies.pdf
Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies
http://www.wilsoncenter.org/index.cfm?fuseaction=events.event_summary&event_id=544514

³³⁵ Anticipating the perceived risk of nanotechnologies
<http://www.nature.com/nnano/journal/vaop/ncurrent/abs/nnano.2009.265.html>
Nanotechnology is viewed favorably, but possible risks should be acknowledged
<http://www.nanowerk.com/news/newsid=12706.php>

³³⁶ Scientists Object to Generalized Nano-Hazard Statements

Military Implications:

Military personnel working in the nanotechnology field should both be alert for such poorly founded conclusions in material they review, and should be certain not to engage in such misleading labeling themselves.

Source:

Nanoparticles – one word: A multiplicity of different hazards
<http://informahealthcare.com/doi/full/10.3109/17435390903337701>

³³⁷ **OECD Reports**

Military Implications:

The OECD reports could provide valuable information for preventing new technologies-related risks as well as potential new standards.

³³⁸ **OECD Reports**

Military Implications:

The OECD reports could provide valuable information for preventing new technologies-related risks as well as potential new standards.

³³⁹ OECD adds new publications to its series on the Safety of Manufactured Nanomaterials

<http://www.nanowerk.com/news/newsid=12391.php>
Preliminary Review of OECD Test Guidelines for their Applicability to Manufactured Nanomaterials
[http://www.oilis.oecd.org/oilis/2009doc.nsf/LinkTo/NT000049AE/\\$FILE/JT03267900.PDF](http://www.oilis.oecd.org/oilis/2009doc.nsf/LinkTo/NT000049AE/$FILE/JT03267900.PDF)

Nanotechnology, Synthetic Biology, & Public Opinion A Report Of Findings Based On A National Survey Among Adults

http://www.nanotechproject.org/process/assets/files/8286/nano_synbio.pdf

Nanotechnology, Synthetic Biology, and Biofuels. What does the public think?

http://www.wilsoncenter.org/index.cfm?fuseaction=events.event&event_id=551829

³⁴⁰ OECD to Release Guidance for Manufactured Nanomaterials Testing

Military Implications:

The military should review this report when it appears, and should consider having a representative attend a future regional meeting.

Source:

OECD to Release Preliminary Guidance For Testing of Manufactured Nanomaterials

<http://ehscenter.bna.com/pic2/ehs.nsf/id/BNAP-7XGFWX?OpenDocument>

³⁴¹ OECD Publishes Nanomaterials Roadmap and Information Gathering Analyses

Military Implications:

Military personnel involved in nanotech risk assessment should review these publications for useful ideas.

Sources:

OECD Nanomaterials Roadmap

[http://www.olis.oecd.org/olis/2009doc.nsf/LinkTo/NT00004E1A/\\$FILE/JT03269258.PDF](http://www.olis.oecd.org/olis/2009doc.nsf/LinkTo/NT00004E1A/$FILE/JT03269258.PDF)

OECD Information Gathering Analyses

[http://www.olis.oecd.org/olis/2009doc.nsf/LinkTo/NT00006F1E/\\$FILE/JT03274953.PDF](http://www.olis.oecd.org/olis/2009doc.nsf/LinkTo/NT00006F1E/$FILE/JT03274953.PDF)

OECD publishes manufactured nanomaterials roadmap 2010

http://www.nanowerk.com/news/newsid=13990.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁴² National Nanotech Regulation Experts Discuss Emerging Issues

Military Implications:

Military personnel concerned with nanotech regulation should review this material for insights on current thinking in the regulatory field.

Source:

National leaders sound off on emerging nanotechnology regulation

<http://www.plantservices.com/articles/2010/06NanotechnologyRegulation.html?page=full>

³⁴³ NanoAssociation for Natural Resources and Energy Security (NANRES) Formed

Military Implications:

Nanotech-concerned military organizations should establish contact with the Association for the beneficial exchange of plans and information.

Sources:

NanoAssociation for Natural Resources and Energy Security (NANRES)

<http://www.nanres.org/>

New nanotechnology association established to address 21st century natural resource and energy security challenges

http://www.nanowerk.com/news/newsid=13992.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁴⁴ Rise of General Public Interest and Outcry

Military Implications:

Military personnel concerned with public communication of nanotech issues should take note of the depth of feeling on the subject, especially in Europe, indicated by these events.

Sources:

Loud Starts End France's Nanotech Debates

<http://blogs.sciencemag.org/scienceinsider/2010/01/a-loud-start-to.html>

The slings and arrows of communication on nanotechnology

<http://www.springerlink.com/content/y6rxm682t4301353/>

Communicating nanotechnology

<http://www.nanowerk.com/spotlight/spotid=14344.php>

Nanotechnology outreach going wrong?

http://www.nanowerk.com/news/newsid=14296.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Outreach Going Wrong? When we talk nano to the public, we are leaving behind key audiences

<http://www.the-scientist.com/2010/1/1/22/1/>

NanoRegulation Conference Report Now Available

<http://www.innovationsgesellschaft.ch/index.php?section=news&cmd=details&newsid=263&teacherId=13>

³⁴⁵ New Paper Claims Nanotech Environmental Downsides Trivialized or Ignored

Military Implications:

As nanotechnology plays an increasing role in essential materiel, the military should consider taking extensive steps to assuage these worries on the part of the European environmental community and to ensure protection of personnel from validly demonstrated hazards.

Sources:

Nanotechnology and the environment: A mismatch between claims and reality

<http://www.nanowerk.com/news/newsid=12357.php>

Nanotechnology and the environment: A mismatch between claims and reality

<http://www.eeb.org/documents/090713-OECD-environmental-Brief.pdf>

³⁴⁶ New Paper Suggests Concentrating Toxicity Studies on Smaller Nanoparticles

Military Implications:

[Same as previous on similar issues] Military personnel concerned with nanotech risk assessment should review this work to assess its possible influence on their plans.

Sources:

When nano may not be nano

<http://www.physorg.com/news172072324.html>

Towards a definition of inorganic nanoparticles from an environmental, health and safety perspective

<http://www.nature.com/nnano/journal/vaop/ncurrent/abs/nnano.2009.242.html>

³⁴⁷ Call for Systematic Studies to Link Nanoproperties and Hazards

Military Implications:

[Same as previous on similar issues] Military personnel concerned with nanotech risk assessment should review this paper to aid in planning their activities.

Sources:

Computational strategies for predicting the potential risks associated with nanotechnology

<http://www.rsc.org/Publishing/Journals/NR/article.asp?doi=b9nr00154a>

News Story: Meridian Nanotechnology and Development News - Headlines for: 9/4/2009

http://www.rsc.org/Publishing/ChemTech/Volume/2009/11/calculated_risk.asp

³⁴⁸ Five-year Review of Royal Society Report

Military Implications:

The five-year review report and the website might constitute a good input source for nanotech-related information.

Source:

A beacon or just a landmark? Reflections on the 2004 Royal Society/ Royal Academy of Engineering Report: Nanoscience and nanotechnologies: opportunities and uncertainties

http://www.responsiblenanoforum.org/pdf/beacon_or_landmark_report_rnf.pdf

³⁴⁹ Report Reviews Nanoparticle Risks and Regulation

Military Implications:

[Same as previous on similar issues] Military personnel concerned with nanotech risk assessment should review the report as additional input to their own research.

Sources:

Nanoparticles, human health hazard and regulation

<http://rsif.royalsocietypublishing.org/content/early/2009/08/31/rsif.2009.0252.focus.short?rss=1>

Nanoparticles, Risk & Regulation

http://www.nanotech-now.com/news.cgi?story_id=34583

³⁵⁰ New Studies Add to Knowledge on Nanoparticles and Biological Reactions

Military Implications:

The military should follow this research as it may help to clarify the mechanisms by which nanoparticles in the environment cause damage when introduced into biological organisms.

Sources:

Interaction of Gold Nanoparticles with Common Human Blood Proteins

<http://pubs.acs.org/doi/abs/10.1021/nm9011187>

Trying to understand the interaction of nanoparticles with blood

http://www.nanowerk.com/spotlight/spotid=14327.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁵¹ Regional Reports on Nanotech Issued by International Group

Military Implications:

Relevant military personnel might consider the ICPCNanoNet repository as a source of professionally legitimate information on the state of research in nanotech around the world.

Source:

ICPC Reports

<http://www.icpc-nanonet.org/content/category/7/20/46/>

³⁵² Improved Investigative Techniques for Identifying Engineered Nanomaterials in the Environment

Military Implications:

Military personnel concerned with nanotech safety should follow up on these various improved technologies.

Source:

Hunting for engineered nanomaterials in the environment

<http://pubs.acs.org/doi/full/10.1021/es902174z>

³⁵³ Insects Are Affected by, and Can Spread, Carbon Nanoparticles

Military Implications:

Military personnel doing nanoparticle risk assessment should take this vector type into consideration in their work, and should also follow further research on such effects and transmission in these and similarly mobile components of the biosphere. Issues of remote, but imaginable, concern could bring litigation against nanoparticle users and weaponization of a unique system of dangerous nanoparticles and delivery insects.

Sources:

New insights into health and environmental effects of carbon nanoparticles

<http://www.nanowerk.com/news/newsid=12021.php>

Differential Toxicity of Carbon Nanomaterials in *Drosophila*: Larval Dietary Uptake Is Benign, but Adult Exposure Causes Locomotor Impairment and Mortality

<http://pubs.acs.org/stoken/presspac/presspac/full/10.1021/es901079z>

³⁵⁴ Industry Silver Nanotech Group Opposes "New Material" Designation

Military Implications:

The military should follow the course of these discussions so as to be prepared for possible new regulatory measures.

Source:

Silver Nanotechnology Working Group: EPA Has Safely Regulated Nanosilver for Decades

<http://www.silverinstitute.org/snwg.php>

³⁵⁵ EPA Unveils Nanotech Risk Research Plan

Military Implications:

Military personnel concerned with nanotech risks and applications should review this document for its comprehensive presentation (49 pp) of the issues and research approaches in the field.

Sources:

Nanomaterial Research Strategy. Office of Research and Development U.S. EPA

Report: http://www.epa.gov/nanoscience/files/nanotech_research_strategy_final.pdf

EPA announces research strategy to study nanomaterials

<http://www.nanowerk.com/news/newsid=12839.php#>

³⁵⁶ EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case

Military Implications:

Military personnel involved with nanotech risk assessment should take this continuing variability in evaluation and regulation into account in their assessments.

Source:

EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case

<http://www.merid.org/NDN/more.php?id=2021>

³⁵⁷ Petition Filed for EPA to Regulate Nanosilver

Military Implications:

The military should follow the further course of this effort, in order to be prepared for possible future nanotech regulations.

Sources:

Demands for Regulation of NanoSilver – The First Battle for the Industry’s Future? Vol. 6/3

<http://www.nanolabweb.com/index.cfm/action/main.default.viewArticle/articleID/300/CFID/2812526/CFTOKEN/41767117/index.html> (Abstract; full article by subscription)

Legal Petition Challenges EPA’s Failure to Regulate Environmental and Health Threats from Nano-Silver. Executive Summary

http://www.icta.org/nanoaction/doc/CTA_nano-silver_executive_summary_5_1_08.pdf

³⁵⁸ Policy Framework for Addressing Nanomaterial Risks in California

Military Implications:

The draft's set of recommendations might provide useful information for addressing nanotech-related risks and potential new future standards that could expand beyond the State of California.

Sources:

Nanotechnology policy framework for addressing nanomaterial risks in California

http://www.nanowerk.com/news/newsid=16113.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

"A Nanotechnology Policy Framework: Policy Recommendations for Addressing Potential Health Risks from Nanomaterials in California"

<http://www.prhe.ucsf.edu/prhe/nanoreportDRAFT.pdf>

³⁵⁹ Health Canada Seeks Comments on Nanomaterials Definition

Military Implications:

Military personnel concerned with nanotech EHS should consider responding to this request (at the address below), in order to give Health Canada the benefit of their knowledge of the field.

Source:

Interim Policy Statement on Health Canada's Working Definition for Nanomaterials

http://www.hc-sc.gc.ca/sr-sr/consult/_2010/nanomater/index-eng.php

³⁶⁰ European Commission to Review Nanomaterial Policies

Military Implications:

[Similar to others on this issue] Military personnel concerned with nanotech environmental risks should keep in touch with EU agencies' activities in carrying out this review and implementing any resultant regulatory measures.

Source:

EU plans to review its policies on nanomaterials

<http://www.nanowerk.com/news/newsid=13104.php>

³⁶¹ European Environmental Bureau Assessment of Nanotech Governance Issues

Military Implications:

[Similar to others on this issue] Military personnel concerned with nanotech environmental risks should keep consider the document as input for assessed governance gaps and eventual regional/international regulations.

Sources:

Nanotechnologies in the 21st Century - A Critical Review of Governance Issues in Europe and Elsewhere Report

<http://www.eeb.org/publication/2009/2009-NanoBrochureNo3-WEB.pdf>

European Environment Bureau assesses critical nanotechnology governance issues

<http://www.nanowerk.com/news/newsid=13044.php>

³⁶² EC's DEEPEN Final Report on Nanotech Development Ethics

Military Implications:

[Similar to others on this issue] Military personnel concerned with nanotech risks and applications should review this document for its potential relevance to future nanotech-related regulations and research approaches in the field.

Sources:

DEEPEN Final Report released 28th September 2009

<http://www.geography.dur.ac.uk/projects/deepen/NewsandEvents/tabid/2903/Default.aspx>

Nanotechnology Decision-Making Needs Greater Public Involvement

<http://www.azonano.com/news.asp?NewsID=13873#>

³⁶³ European FramingNano Governance Platform

Military Implications:

Given the close collaboration between EU and U.S. nanotech experts and the high level of the Governance Platform, it is likely that it will set the stage for an international regulatory framework for responsible nanotech development. Military personnel concerned with nanotech regulation policy should review this document for potential guidelines and collaboration.

Sources:

FramingNano report on current and future challenges in nanotechnology governance

http://www.nanowerk.com/news/newsid=14269.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

FramingNano Project: A multistakeholder dialogue platform framing the responsible development of Nanosciences & Nanotechnologies

http://www.innovationsgesellschaft.ch/media/archive2/publikationen/FramingNano_Complete_Final_Report.pdf

A New Governance Framework for Nanotechnologies (conference page, with “Proceedings now available for members”)

<http://www.framingnano.eu>

Brussels conference discusses nanotechnology governance platform

http://www.nanowerk.com/news/newsid=14269.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁶⁴ European Consumer Organizations Call for Better Nano Regulation

Military Implications:

Military personnel concerned with nanotech regulation, especially in Europe, should review the inventory and the accompanying statement for insight into the probable course of regulatory activities on the continent. Also, similar developments could occur in the U.S.

Source:

EU consumer bodies launch nanotechnology consumer product inventory

<http://www.nanowerk.com/news/newsid=13465.php>

³⁶⁵ EC Publishes Paper on Options for Framing Public Policy on Nanotech

Military Implications:

The military should review this paper for its insight into European views on nanotech regulation.

Sources:

Understanding Public Debate on Nanotechnologies: Options for Framing Public Policy

<http://www.innovationsgesellschaft.ch/index.php?section=news&cmd=details&newsid=289&teacherId=>

Understanding Public Debate on Nanotechnologies. Options for Framing Public Policy

http://www.innovationsgesellschaft.ch/media/archive2/tv_radio_und_printartikel/Debate_nano_100203.pdf

³⁶⁶ Five-Year European Study of the Needs and Opportunities for Nanotech R/D

Military Implications:

Although the emphasis of the report is on a particular set of research techniques, it should still provide a useful overview of the current state and future prospects of nanotech R/D.

Sources:

GENNESYS White Paper

<http://www.merid.org/nanodev/more.php?articleID=2589>

³⁶⁷ Nanomaterials Labeling in New EU Uniform Cosmetics Rule

Military Implications:

The military should note this action as a possible harbinger of more stringent regulation of nanomaterials in other product lines and by other jurisdictions, and prepare for appropriate changes in procurement, use and disposal.

Sources:

Germany resists EU regulation for 'nanotechnology' label for cosmetics

http://www.nanowerk.com/news/newsid=13681.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Regulation of the European Parliament and of the Council on cosmetic products (recast); PE-CONS 3623/09

<http://register.consilium.europa.eu/pdf/en/09/st03/st03623.en09.pdf>

³⁶⁸ French Group Opens Public Web Site on Nanotechnology

Military Implications:

It would be useful for a French-speaking military representative to monitor this site to gain an appreciation of the public mood toward nanotechnology in this part of Europe.

Source:

ACEN launches collaborative website on societal issues raised by nanotechnology

<http://www.nanowerk.com/news/newsid=16756.php>

Web site: <http://nano.acen-cacen.org>

³⁶⁹ German Body Advises against Nanosilver in Consumer Products

Military Implications:

Military personnel concerned with nanotech risk assessment should add this finding to their store of existing opinion on the hazards of this material.

Sources:

Nanosilver has no place in food, textiles or cosmetics

<http://www.bfr.bund.de/cd/50960>

Nanosilver Has No Place in Food, Textiles or Cosmetics

<http://www.bfr.bund.de/cd/50960>

³⁷⁰ Russia Sets Up Nanotech Risk Assessment and Regulation Cooperation

Military Implications:

The military should consider setting up liaison with this joint effort, for the exchange of ideas on policies, standards, procedures, and regulations.

Source:

Russian effort to ensure nanotechnology safety

http://www.nanowerk.com/news/newsid=14832.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁷¹ Russia and Finland to Cooperate on Nanotech Regulation Development

Military Implications:

The military should follow this work for possible ideas on problems in nanotech regulation and how to coordinate international efforts in that area.

Source:

Russia and Finland Collaborate on Model for Regulating Nanotechnology

<http://www.rosnano.ru/Post.aspx/Show/25026>

³⁷² Australia Sets Up Framework for Safe Nanotech

Military Implications:

The military should review the Strategy for useful ideas, and also establish contact with the effort, in order to exchange useful thoughts and experiences on technology policy, standards, and regulation.

Sources:

National Enabling Technologies Strategy Policy

<http://www.innovation.gov.au/Industry/Nanotechnology/Pages/NationalEnablingTechnologiesStrategyConsultations.aspx>

Australia launches national framework for safe development of bio- and nanotechnology

http://www.nanowerk.com/news/newsid=14962.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁷³ Australian Government Proposes New Nanotech Regulations

Military Implications:

Military personnel concerned with nanotech regulation should review this proposal, especially considering its possible role as a model, and also consult Dr. Wickson's paper for its recommendations.

Sources:

Nanotechnology - Stakeholder Consultation

http://www.nicnas.gov.au/Current_Issues/Nanotechnology/Stakeholder_Consultation.asp

Government invites consultations on strengthening nanomaterial regulations in Australia

<http://www.nanowerk.com/news/newsid=13431.php>

Australia Seeks Comment on Proposal for Regulating Industrial Nanomaterials

http://news.bna.com/deln/DELNWB/split_display.adp?fedfid=15757279&vname=denotallissues&fn=15757279&jd=a0c1k2r9g5&split=0

What you should know about nano. Policy Brief No. 8, November 2009, ISSN 1836-9014

https://www.tai.org.au/file.php?file=/media_releases/PB8%20Nanotechnology%20final.pdf

Nanotechnology - the sexy new science with lots of unanswered questions

http://www.nanowerk.com/news/newsid=13702.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁷⁴ India to Establish Nanotechnology Regulatory Board

Military Implications:

The military should establish liaison with this new body for the exchange of ideas on nanotech regulation.

Sources:

India to have Nanotechnology Regulatory Board soon

<http://www.business-standard.com/india/news/india-to-have-nanotechnology-regulatory-board-soon/86186/on>

Nano Mission Council

http://www.dst.gov.in/about_us/ar07-08/nano-mission.htm

³⁷⁵ Nanomaterials Guidelines Adopted by 53 African Countries

Military Implications:

AFRICOM should explore the potential for military-to-military programs to develop capacity to manage nanomaterials in the continent. While global regulations on nanotechnologies are

moving slowly, it is possible that countries lacking assessment and handling capacity for nanomaterials will adopt local and regional precautionary policies. Although the African resolution is non-binding, military components and their contractors dealing with nanomaterials should be prepared to comply with probable future regulations along these lines, not only in Africa but also in all developing countries.

Sources:

African Resolution Urges Nations Worldwide to Ensure Safe Handling of Nanomaterials

<http://www.merid.org/nanodev/more.php?id=2459>

CIEL welcomes and supports African resolution on nanomaterials

http://www.ciel.org/Chemicals/African_Nano_17Feb10.html

³⁷⁶ **Databases on Nanosafety**

Military Implications:

Military personnel involved with nanotech safety issues should follow evolution of this projects and also consider offering the developers the benefit of their experience.

Sources:

Information about database:

http://www.oecd.org/document/26/0,3343,en_2649_37015404_42464730_1_1_1_1,00.html#Additional_Info

Database access: <http://webnet.oecd.org/NanoMaterials>

NHECD

<http://www.nhecd-fp7.eu/index.php?id=515>

³⁷⁷ New Map of Nanotech Centers

Military Implications:

Relevant military R&D, procurement, and preventive health personnel should familiarize themselves with this resource.

Sources:

Mapping nanotechnology in the U.S.

<http://www.nanowerk.com/news/newsid=12202.php>

PEN Map

www.nanotechproject.org/121

³⁷⁸ New Wiki on Safe Nanotech in the Workplace

Military Implications:

Military personnel responsible for nanotech safety issues should familiarize themselves with this resource, and consider participating in it.

Sources:

News story: Meridian Nanotechnology and Development News, 6/2/2009 -

<http://www.merid.org/nanodev/>

Guide: <http://www.goodnanoguide.org/tiki-index.php?page=HomePage>

³⁷⁹ ILO Booklet on Workplace Hazards

Military Implications:

The ILO booklet could provide valuable information for preventing new technologies-related health hazards and analyzing potential new standards for work environment.

Source:

Focus on new emerging hazards in a changing world of work

http://www.ilo.org/global/About_the_ILO/Media_and_public_information/Press_releases/lang--en/WCMS_126383/index.htm

³⁸⁰ Comprehensive Review of Engineered Nanomaterials Health And Safety

Military Implications:

Military personnel concerned with nanotech risk assessment should review this report for new inputs to their own work.

Sources:

ENRHES report provides in-depth examination of nanomaterials safety

http://www.nanowerk.com/news/newsid=14387.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Engineered Nanoparticles - Review of Health & Environmental Safety project final report

<http://nmi.jrc.ec.europa.eu/documents/pdf/ENRHES%20Review.pdf>

³⁸¹ Nanotechnology--Assessment of Health Safety and Environmental Factors

Military Implications:

[Same as previous on similar issues] Military personnel concerned with nanotech risk assessment should evaluate this rather expensive report for possible acquisition to provide new inputs to their own work.

Source:

Nanotechnology - Assessment of Health Safety and Environmental Factors

http://www.researchandmarkets.com/product/02ab42/nanotechnology_assessment_o

³⁸² Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology

Military Implications:

Military personnel concerned with nanoparticle risks should review this book for additional input to their own work.

Source:

Environmental Regulation in the Age of Nanotechnology

<http://www.earthscan.co.uk/?tabid=102261>

Environmental Regulation in the Age of Nanotechnology

<http://www.rffpress-earthscan-usa.com/Books/BookDetail.aspx?productID=236827>

Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology

<http://www.merid.org/nanodev/more.php?articleID=2508&search=%2Fnanodev%2Farchive.php%3FdoSearch%3D1%26items%3D20%26q%3Duncertainty%26sortField%3DPosted%26submit%3DSearch&scorePrecent=100>

³⁸³ EU Efforts Underway to Improve Nanotech EHS Information

Military Implications:

To aid them in their work, military personnel concerned with both nanotech risk assessment and applications should become familiar with these efforts.

Source:

EU study tackles nanotoxicology dilemma

http://ec.europa.eu/research/infocentre/article_en.cfm?id=/research/headlines/news/article_09_07_03_en.html&item=Infocentre&artid=12033

Nanotechnology: the things we don't know

<http://www.nanowerk.com/spotlight/spotid=11497.php>

The known unknowns of nanomaterials: Describing and characterizing uncertainty within environmental, health and safety risks

<http://www.informaworld.com/smpp/content~db=all?content=10.1080/17435390902944069>

³⁸⁴ Report Suggests Current Nanotech Protective Gear May Not Be Adequate

Military Implications:

[Similar to others on this issue] Relevant military personnel should review the paper for potential relevance to future nanotech-related regulations.

Sources:

Current safety equipment may not be adequate for nanoprotection

<http://www.nanowerk.com/news/newsid=13054.php>

Paper in the International Journal of Nanotechnology (Int. J. Nanotechnol., 2010, 7, 99-117) (Not yet available at the time of this writing)

³⁸⁵ Study Shows Toxicity Implications of Nanoparticle Size

Military Implications:

The military should take note of these findings as reflecting the complex relationships among physical, chemical, and biological factors in nanotech risk assessment, requiring the utmost care in ensuring that all possibly relevant parameters of experimental studies have been thoroughly taken into account.

Source:

Assessment of the In Vivo Toxicity of Gold Nanoparticles

http://springerlink.com/content/t67n820852546433/?p=5ec561e448b34bf1b2bc9d08c3c42fe2&p_i=13

³⁸⁶ Study Shows Ill Effects of Multiwall Carbon Nanotubes

Military Implications:

When appropriate, military personnel concerned with nanotech risk evaluation should consider these findings in their analyses and conclusions.

Source:

Inhalation Toxicity of Multi-Wall Carbon Nanotubes in Rats Exposed for 3 Months

<http://toxsci.oxfordjournals.org/cgi/content/abstract/kfp146>

³⁸⁷ Researchers Call for Broad Approach to Nanotube Risk Assessment

Military Implications:

[Same as previous on similar issues] Military personnel concerned with nanotech risk assessment should review this paper for input to their own research.

Sources:

“A toxicological approach to hazard assessment of carbon nanotubes: implications for workers’ health protection” in Int. J. Environment and Health, 2009, 3, 249-263 (International Journal of Environment and Health (IJENVH); Volume 3 - Issue 3 – 2009)

<http://www.inderscience.com/browse/index.php?journalID=142&year=2009&vol=3&issue=3>

Carbon nanotube risk assessment

<http://www.nanowerk.com/news/newsid=12653.php>

³⁸⁸ European Project to Study Metal Oxide Nanoparticle Risks

Military Implications:

[Similar to others on this issue] Military personnel concerned with nanotech risk assessment should follow this project to incorporate its findings into their work.

Sources:

European project evaluates possible health impact of metal oxide nanoparticles

<http://www.nanowerk.com/news/newsid=12904.php#>

CIC biomaGUNE is to lead a european project that will test the toxicity of the nanoparticles in metal oxides

http://www.cicbiomagune.es/secciones/noticias/noticias_detalle.php?idioma=en&id_noticia=33

³⁸⁹ Metallic Impurities Affect Carbon Nanotube Toxicity

Military Implications:

[Same as previous on similar issues] Military personnel responsible for nanotech risk assessment should heed this warning that current safety evaluation techniques may be deficient.

Sources:

How safe are carbon nanotubes?

http://www.rsc.org/Publishing/ChemScience/Volume/2009/11/carbon_nanotubes.asp

What amount of metallic impurities in carbon nanotubes is small enough not to dominate their redox properties?

<http://www.rsc.org/Publishing/Journals/NR/article.asp?doi=b9nr00071b>

³⁹⁰ Questions Raised on Reliability of In Vitro Nanomaterials Toxicity Testing

Military Implications:

The military should consider these factors in planning and conducting nanotech risk assessment activities.

Sources:

In vitro assessments of nanomaterial toxicity (Abstract)

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T3R-4W3PT31-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1103877437&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=77b493bee3add76d325ab37d621acc00

Cell Tests Can Produce Any Desired Result about Nanomaterial Toxicity, Speaker Says

<http://www.merid.org/NDN/more.php?id=2270>

³⁹¹ New Results on TiO₂ Nanoparticle Toxicity to Cells

Military Implications:

Military personnel concerned with nanotech applications and risk assessment should review this paper for its possible impact on their work.

Sources:

Nanoparticles used in common household items caused genetic damage in mice

<http://www.physorg.com/news177608158.html>

Titanium Dioxide Nanoparticles Induce DNA Damage and Genetic Instability In vivo in Mice
Cancer Res. 69: 8784-8789

<http://cancerres.aacrjournals.org/cgi/gca?sendit=Get+All+Checked+Abstract%28s%29&SEARCHID=1&FULLTEXT=tio2&VOLUME=69&ISSUE=22&FIRSTINDEX=0&hits=10&RESULTFORMAT=&gca=canres%3B69%2F22%2F8784>

³⁹² New Technique for Non-toxic Nanosilver

Military Implications:

The military should take note of this possible solution to the environmental problem pointed out in the previous warning at 5.9.7.

Source:

How to make nanosilver non-cytotoxic with sugar

<http://www.nanowerk.com/spotlight/spotid=11406.php>

³⁹³ New Technique May Reduce Silver Nanoparticle Hazard

Military Implications:

The military should follow this research in order to take its findings into account in nanotech risk assessment.

Source:

Chemists manage to reduce the toxicity of antimicrobial nanosilver in products

http://www.nanowerk.com/news/newsid=15028.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁹⁴ Sodium Chololate Found to Be Safe Surfactant for Carbon Nanotubes

Military Implications:

Military risk assessment personnel should take these findings into account in evaluating nanotube processing.

Source:

Cytotoxicity Effects of Different Surfactant Molecules Conjugated to Carbon Nanotubes on Human Astrocytoma Cells

<http://www.springerlink.com/content/g5x542181j646494/>

³⁹⁵ Device for Nanoparticle Study

Military Implications:

The military should investigate this new instrument for its possible applicability in nanotechnology evaluation.

Source:

qNano

<http://www.izon.com/products-services/qnano>

³⁹⁶ Lack of Standards for Engineered Nanoparticles in European Surface Waters

Military Implications:

Military personnel concerned with nanotech risks should monitor probably forthcoming work on how ENPs should be handled in the WFD, in anticipation of regulatory measures.

Sources:

Setting the limits for engineered nanoparticles in European surface waters – are current approaches appropriate? J. Environ. Monit., 2009, 11, 1774 - 1781, DOI: 10.1039/b909730a

http://www.rsc.org/delivery/_ArticleLinking/DisplayHTMLArticleforfree.cfm?JournalCode=EM&Year=2009&ManuscriptID=b909730a&Iss=10

EU Water Framework Directive—information page

http://ec.europa.eu/environment/water/water-framework/index_en.html

³⁹⁷ "Environmental and Human Health Impacts of Nanotechnology"

Military Implications:

Military personnel concerned with nanotech risk assessment should consider acquiring this book.

Source:

Environmental and Human Health Impacts of Nanotechnology

http://www.researchandmarkets.com/reportinfo.asp?report_id=1083599&t=d&cat_id=

³⁹⁸ “Nanoethics: Big Ethical Issues With Small Technology”*Military Implications:*

Military personnel concerned with nanotech environmental issues should consider the report for potential inputs to their own work.

Sources:

Nanoethics Big Ethical Issues with Small Technology

<http://www.continuumbooks.com/books/detail.aspx?BookId=132355&SearchType=Basic>

Nanoethics: Big ethical issues with small technology

http://www.nanowerk.com/news/newsid=13819.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

³⁹⁹ UK Solicits Participation in Nanotech Policy Formulation*Military Implications:*

Military personnel concerned with nanotechnology assessment and regulation should follow this web site and possibly participate in the discussions carried on there, both to inform themselves on these questions and to offer the benefit of their opinions.

Source:

Nanotechnologies: influence and inform the UK strategy

<http://interactive.bis.gov.uk/nano/>

⁴⁰⁰ UK House of Lords Committee Urges Nanosafety Transparency*Military Implications:*

Although this action is of quite limited scope, both geographically and topically, it adds to the continuing public and governmental pressure for better information on nanotech hazards, information which the military must continue strong efforts to elicit from researchers and contractors.

Sources:

Press Notice: Science and Technology Committee - Nanotechnologies and Food

http://www.parliament.uk/parliamentary_committees/lords_press_notices/pn080110st.cfm

Nanotechnologies and Food. Science and Technology Committee, First Report

<http://www.publications.parliament.uk/pa/ld/ldscitech.htm>

Peers criticise food industry secrecy on nanotechnology

<http://www.guardian.co.uk/business/2010/jan/08/food-industry-nanotechnology-secrecy>

⁴⁰¹ UK Report Calls on Government to Support Nanotech Risk Assessment*Military Implications:*

Military personnel concerned with nanotech risk assessment should review this 29-page report for its recommendations on the role of government in that kind of work.

Source:

Nanotechnology: a UK Industry View (report)

http://mnt.globalwatchonline.com/epicentric_portal/binary/com.epicentric.contentmanagement.servlet.ContentDeliveryServlet/MNT/Knowledge%2520Centre/MiniIGTReport2010.pdf

Business urges campaign over 'grey goo' fears

<http://www.ft.com/cms/s/0/82d93a8a-00ad-11df-ae8d-00144feabdc0.html> (Requires a free subscription registration.)

⁴⁰² UK Nanotech EHS Directory Published

Military implications:

Military personnel concerned with nanotech EHS issues should become familiar with this useful reference work.

Sources:

NanoKTN publishes a UK nanotechnology health, safety and environment directory

http://www.nanowerk.com/news/newsid=13506.php?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

UK Nanotechnology Health, Safety and Environment Directory 2009

http://mnt.globalwatchonline.com/epicentric_portal/binary/com.epicentric.contentmanagement.servlet.ContentDeliveryServlet/MNT/Knowledge%2520Centre/UKNanoHSEDirectory1.5.pdf

⁴⁰³ UK Defra Committee Report on Nanosilver

Military Implications:

Military personnel concerned with nanotech risk assessment should review this paper.

Source:

Advisory Committee on Hazardous Substances Report on Nanosilver

<http://www.nanoforum.org/dateien/temp/achs-report-nanosilver.pdf?20112009112655>

⁴⁰⁴ UK Nanotechnologies Strategy: Small Technologies, Great Opportunities report

Military Implications:

Relevant military personnel should review the UK report to assess potential implications of nanotech regulations globally and eventual recommendations for national nanotech development.

Sources:

UK Nanotechnologies Strategy: Small Technologies, Great Opportunities

<http://interactive.bis.gov.uk/nano/>

UK Nanotechnologies Strategy; Small Technologies, Great Opportunities

<http://bis.gov.uk/assets/biscore/corporate/docs/n/10-825-nanotechnologies-strategy>

The UK Nanotechnologies Strategy – disappointing (commentary article by Dr. Andrew Maynard of PEN)

<http://2020science.org/2010/03/18/the-uk-nanotechnologies-strategy-disappointing/>

⁴⁰⁵ Norwegian Research Group Launches Nanotech Particles Project

Military Implications:

[Similar to others on this issue] Military personnel should contact SINTEF and arrange to keep in touch with the organization's research projects.

Sources:

Nanoparticles - toxic or harmless?

<http://www.nanowerk.com/news/newsid=12802.php#>

SINTEF Group

<http://www.sintef.no/Home/>

⁴⁰⁶ New Centre for Nano Safety Established in Scotland

Military Implications:

The military should establish contact with the new center to ensure receipt of its research results.

Sources:

New nanomaterials safety research center launched in the UK

<http://www.nanowerk.com/news/newsid=13489.php>

Centre for Nano Safety

<http://www.napier.ac.uk/RANDKT/RKTCENTRES/NANOSAFETY/Pages/CentreforNanoSafety.aspx>

⁴⁰⁷ Tunisia Sets Up Unit for Environmental Applications and Nanotechnology

Military Implications:

A military representative in Tunis should contact the partnership to arrange for exchange of information, and cooperation on nanotech issues between the two countries

Source:

Nanotechnology for the Environment

<http://www.tunisiaonlinenews.com/?p=30787>

⁴⁰⁸ First Sri Lankan Information Portal for Nanotechnology

Military Implications:

A military representative in Colombo should contact SLINTEC to establish liaison with this new enterprise, for the exchange of news, information, and ideas on nanotechnology, especially in the area of EHS and regulation.

Source:

Pyxle Develops Nano-Based Information Portal for Sri Lanka

<http://www.azonano.com/news.asp?newsID=16657>

⁴⁰⁹ NGO Coalitions Raise Doubts about Nanotech and the Environment

Military Implications:

Responsible military organizations should carefully review these allegations and take them into account in planning and carrying out nanotech risk control and assessment and in communicating the quality of that work to the public. If valid, they should be applied to procurement and use of nanotech products.

Source:

Nanotechnology and the environment: A mismatch between claims and reality

<http://www.nanowerk.com/news/newsid=11736.php>

⁴¹⁰ Study Shows Nano Damage Differs by Medium, Target Kingdom

Military Implications:

This paper adds to the growing picture of the complexity of the nanomaterial vs. biosphere interaction, a complexity that those concerned with nanotech risk assessment must constantly keep in mind in evaluating research results.

Source:

Nanotoxicology - mammalian and plant cells respond differently to fullerenes

<http://www.nanowerk.com/spotlight/spotid=15231.php>

⁴¹¹ New Technique Allows Study of Nanoparticles in Embryos

Military Implications:

The military should follow these studies, to take advantage of their results in nanotech risk assessment.

Sources:

Vigilance needed in nanotechnology

<http://www.physorg.com/news186839917.html>

Measuring properties of nanoparticles in embryonic blood vessels: Towards a physicochemical basis for nanotoxicity

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TFN-4YCG05D-1&_user=10&_coverDate=02%2F12%2F2010&_alid=1233416266&_rdoc=1&_fmt=high&_orig=search&_cdi=5231&_sort=r&_docanchor=&_view=c&_ct=4&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=885fe697f75d566b4bc79ca84701d2ef

⁴¹² Guide for Unbound Nanoparticles in Occupational Settings Made Available

Military Implications:

Military personnel concerned with nanoparticle risks should review this guide. A detailed description of its contents can be found at the cited site.

Source:

ASTM E2535 - 07 Standard Guide for Handling Unbound Engineered Nanoscale Particles in Occupational Settings

<http://www.astm.org/Standards/E2535.htm>

Standard Guide for Handling Unbound Engineered Nanoscale Particles in Occupational Settings
<http://www.merid.org/nanodev/more.php?articleID=2496&search=%2Fnanodev%2Farchive.php%3FdoSearch%3D1%26items%3D20%26q%3DASTM%2Bunbound%26sortField%3DPosted%26submit%3DSearch&scorePrecent=100>

⁴¹³ Worldwide Nanotech Labs Deficient in EHS Protection

Military Implications:

The military should conduct reviews to ensure that military and contractor installations handling nanomaterials are following proper procedures to protect individual and environmental health and safety.

Sources:

Reported Nanosafety Practices in Research Laboratories Worldwide

<http://www.merid.org/NDN/more.php?id=2400>

Reported nanosafety practices in research laboratories worldwide

<http://www.nature.com/nnano/journal/vaop/ncurrent/full/nnano.2010.1.html> (abstract; subscription or purchase required for full text)

⁴¹⁴ Australian Group Releases Two Workplace Nanosafety Reports

Military Implications:

Relevant military personnel should consider the Australian reports for eventual inputs to their own work.

Sources:

Safe Work Australia releases two new reports for its Nanotechnology Occupational Health and Safety Program

http://www.nanowerk.com/news/newsid=13469.php?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

⁴¹⁵ New Nanotech Survey Book Covers Environmental Aspects

Military Implications:

Military personnel concerned with nanotech questions should review this book for its insights into the current state of research in the field.

Sources:

Nano-Society. Pushing the Boundaries of Technology

<http://www.rsc.org/Shop/books/2009/9781847558831.asp>

Nano-Society - Pushing the boundaries of technology (News story)

<http://www.nanowerk.com/spotlight/spotid=12798.php#>

⁴¹⁶ What Is Nanotechnology and Why Does It Matter? Book on Nanotechnology and Ethics

Military Implications:

Relevant military personnel should consider the book for additional inputs on potential nanotech-related ethical aspects that could have implications for nanotech use by the military.

Source:

Collaboration between ethicists and nanotechnology scientists reveals unique synergies and insights

http://www.nanowerk.com/news/newsid=15191.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

⁴¹⁷ Paper Examines "Nanotechnology: Safe By Design?"

Military Implications:

Relevant military should review this paper for additional input in its own development and risk assessment work.

Source:

Examining the Holy Grail of Nanotechnology: Safe By Design

<http://www.azonano.com/details.asp?ArticleId=2508>

⁴¹⁸ Paper Reviews Nanotech Remediation of Waste Sites

Military Implications:

Relevant military personnel might consider the paper mostly for the information on “future directions for nanoremediation,” which might prove valuable in future cleanup actions.

Sources:

New nanotechnology review article focuses on environmental clean-up

http://www.nanowerk.com/news/newsid=14720.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

Nanotechnology and in Situ Remediation: A Review of the Benefits and Potential Risks

<http://ehsehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.0900793>

⁴¹⁹ **New EU Body Recommended for Assessing Human Enhancement**

Military Implications:

Relevant military personnel should review the military applications of HET sections of the report, continue to be part of the broader HET discourse to contribute and be prepared to comply with eventual new national and international agreements and regulations.

Sources:

European Parliament. Science and Technology Options Assessment. Human Enhancement Study

http://www.europarl.europa.eu/stoa/publications/studies/stoa2007-13_en.pdf

Staff conversations with one of the authors: Gregor Wolbring gwolbrin@ucalgary.ca

420 Genetic Patenting and GMO Face New Challenges*Military implications:*

The military should be prepared to deal with new situations triggered by controversial GMO patenting practices or restriction, such as implications for economic development and international relations, as well as potential illicit trafficking of patents or GMO products.

Sources:

Gene Patents Ruled Invalid

<http://www.technologyreview.com/blog/editors/24986/>

Impact of Genetically Engineered Crops on Farm Sustainability in the United States

http://www.nap.edu/catalog.php?record_id=12804

421 U.S. Should Launch a New Biology Initiative*Military Implications:*

The military should consider the report's outcomes and seek support and collaboration for a National New Biology Initiative in the spirit of reducing the military environmental footprint.

Source:

National New Biology Initiative Offers Potential For 'Remarkable and Far-reaching Benefits'

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12764>

422 International Legal Frameworks Needed for Cybersecurity*Military Implications:*

The military should increase its efforts to raise the profile of these issues to improve global cybersecurity strategy, and design for international legal frameworks, norms, and standards with enforcement measures.

Sources:

NATO's cyber-brains gaze at the future of war

http://www.spacewar.com/reports/NATOs_cyber-brains_gaze_at_the_future_of_war_999.html

Shadows in the Cloud: An investigation into cyber espionage 2.0

<http://www.infowar-monitor.net/2010/04/shadows-in-the-cloud-an-investigation-into-cyber-espionage-2-0-2/>

LockMart Supports National Security Agency's 2010 Cyber Defense Exercise

http://www.spacewar.com/reports/LockMart_Supports_National_Security_Agency_2010_Cyber_Defense_Exercise_999.html

EU to set up anti-cybercrime body

<http://euobserver.com/9/29946/?rk=1>

423 Reconsidering the Rules for Space Security*Military Implications:*

There is increasing agreement that the Outer Space treaty should be updated in view of current and future challenges concerning space security. This book is a source of information for those efforts.

Source:

Reconsidering the Rules for Space Security

<http://www.amacad.org/publications/reconsidering.aspx>

⁴²⁴ European Space Agency First International Security Symposium

Military Implications:

Relevant military personnel should attend the symposium for increased collaboration on security issues.

Source:

First International Security Symposium

http://www.esa.int/esaCP/SEM08TRJR4G_Benefits_0.html

⁴²⁵ The Chaos Caused by the Volcanic Eruption in Iceland Revealed Lack of a Global Framework to Deal with Large-Scale Air Traffic Disturbances

Military Implications:

This is increased evidence that the military should continue planning, coordination, and training with counterparts around the world for assisting people's relocation and/or security in such large-scale disruptions (this time the UK used military ships to repatriate some of its stranded travelers).

Sources:

Europe scales down response to ash cloud

<http://euobserver.com/9/29892/?rk=1>

The impact of the volcanic ash cloud crisis on the air transport industry. Information Note to the Commission. SEC(2010) 533

http://ec.europa.eu/commission_2010-2014/kallas/headlines/news/2010/04/doc/information_note_volcano_crisis.pdf

Will Global Warming Make Iceland's Volcanoes Angry?

<http://news.discovery.com/earth/will-global-warming-make-icelands-volcanoes-angry.html>

⁴²⁶ Nuclear Nonproliferation Treaty Review Conference Adopted Document for Reducing Nuclear Threat

Military Implications:

[Same as previous on this issue] The military should continue to explore these and other initiatives as options to advance nuclear disarmament and facilitate NPT negotiations and improve global nuclear safety.

Sources:

2010 NPT Review Conference

<http://www.un.org/en/conf/npt/2010/>

Nuclear Conference Approves Limited Nonproliferation Measures

http://gsn.nti.org/gsn/nw_20100601_1163.php

PM's Office: Israel won't comply with NPT resolution

<http://www.ynetnews.com/articles/0,7340,L-3895780,00.html>

Chad becomes 100th nation to give UN nuclear inspectors greater access

<http://www.un.org/apps/news/story.asp?NewsID=34697&Cr=nuclear&Cr1=>

⁴²⁷ **IAEA Database Recorded 1,562 Nuclear Trafficking Incidents for the Period 1993–2008**

Military Implications:

The military should increase its efforts, domestically and internationally, in proportion to the increasing incidence of nuclear material proliferation.

Sources:

IAEA Tracks Illicit Possession of Nuclear Materials

http://gsn.nti.org/gsn/nw_20090817_4827.php

IAEA Annual Report 2008 (1 January to 31 December 2008)

http://www.iaea.org/Publications/Reports/Anrep2008/anrep2008_full.pdf

⁴²⁸ **Advancements on Denuclearization**

Military Implications:

The military should explore these and other initiatives as options to advance nuclear disarmament and facilitate NPT negotiations and improve global nuclear safety.

Sources:

New Strategic Arms Reduction Treaty (New START)

<http://www.state.gov/t/vci/trty/126118.htm>

Nuclear Posture Review

<http://www.defense.gov/npr/>

Nuke-Free Middle East Needed to Resolve Iran Dispute, Egypt Asserts

http://gsn.nti.org/gsn/nw_20100428_9811.php

Malaysia Pledges to Carry Out WMD Smuggling Penalties

http://gsn.nti.org/gsn/nw_20100415_4276.php

Controversial Indian law on nuclear liability spells disaster – activists

http://www.alertnet.org/db/an_art/55867/2010/03/14-111827-1.htm

⁴²⁹ **Nuclear Disarmament Dilemma Continues**

Military Implications:

The military should continue to assess opportunities to facilitate the NPT negotiations and international cooperation to improve nuclear safety, as well as recommend policy, training, and institutional or physical changes to implement the resolution.

Sources:

START Talks to Continue in Geneva in January: Dec. 22 State Department Briefing

<http://geneva.usmission.gov/2009/12/23/start-talks/>

U.S.-Russia arms control treaty expires

<http://www.washingtontimes.com/news/2009/dec/05/arms-control-treaty-expires/>

START Talks to Continue, Leaders Order

http://gsn.nti.org/gsn/nw_20091214_5756.php

U.S. hopes to sign new arms cuts accord with Russia by yearend

<http://en.rian.ru/world/20091209/157165081.html>

On Recommendation of First Committee, General Assembly Adopts 54 Texts, Sets Aside Four Weeks in 2012 to Hammer Out Legally Binding Arms Trade Treaty

<http://www.un.org/News/Press/docs/2009/ga10898.doc.htm>

Adoption of the Draft Resolution on Nuclear Disarmament Submitted by Japan to the United Nations General Assembly

http://www.mofa.go.jp/announce/announce/2009/12/1197754_1148.html

Commission Report Launched in Tokyo: Towards a Nuclear Weapon Free World

http://www.icnnd.org/releases/091215_report.html

Urgent call for nuclear arms cull

<http://www.theage.com.au/national/urgent-call-for-nuclear-arms-cull-20091213-kqih.html>

AUSTRALIA may be forced to acquire nuclear weapons to tackle deteriorating Asian security, a government-funded defence think tank has warned.

<http://www.theaustralian.com.au/news/nation/nation-given-n-bomb-warning/story-e6frg6nf-1225809977267>

⁴³⁰ Dialogues for Creating a Northeast Asia Nuclear Weapon-Free Zone

Military Implications:

Military stationed in Northeast Asia should be prepared to participate in talks and actions leading to an eventual nuclear-free zone. Also, the military should assess all the opportunities to facilitate the NPT negotiations and international cooperation to improve global nuclear safety, as well as to recommend policy, training, and institutional or physical changes needed to implement the recommendations – all within the context of overall U.S. policy.

Sources:

Joint Statement by Parliamentarians of Japan and the Republic of Korea toward the Denuclearization of Northeast Asia

http://www.gsinststitute.org/pnnd/docs/02_28_10_Japan-ROK_Statement.pdf

Treaty on the Northeast Asia Nuclear-Weapon-Free Zone (tentative translation)

<http://www.gsinststitute.org/pnnd/docs/NEA-NWFZ.pdf>

Australia, Japan Submit Disarmament Proposals For NPT Review Conference

http://gsn.nti.org/gsn/nw_20100324_4743.php

Waste Management

⁴³² Renewed Calls for Strengthening E-Waste Management Regulations

Military Implications:

[Similar to previous on this issue] Military personnel might be called upon to collaborate in the efforts to detect, intercept, and prevent illegal e-waste trafficking and handling. Also, the military and its contractors should ensure compliance with all appropriate, current waste management regulations.

Sources:

Urgent Need to Prepare Developing Countries for Surge in E-Wastes

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=612&ArticleID=6471&l=en>

Recycling – From E-waste to Resources (report)

http://www.unep.org/PDF/PressReleases/E-Waste_publication_screen_FINALVERSION-sml.pdf

Dedicated EU body needed to ensure enforcement of European waste law, says Commission study

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/113&format=HTML&aged=0&language=EN&guiLanguage=en>

Study on the feasibility of the establishment of a Waste Implementation Agency

http://ec.europa.eu/environment/waste/pdf/report_waste_dec09.pdf

Report on joint enforcement actions on waste shipments

http://ec.europa.eu/environment/waste/pdf/impel_report_09.pdf

⁴³³ **Organized Crime Targets Electronic Waste Recycling**

Military implications:

Military personnel — mostly those stationed in affected developing countries — might be called upon to collaborate in the efforts to counter illegal export, dumping, and dismantling of electronic waste.

Source:

Organised crime targets waste recycling

<http://www.guardian.co.uk/technology/2009/jul/08/recycling-electronic-waste-crime>

⁴³⁴ **Hazardous Waste Disposal of Increasing Concern**

Military implications:

Military personnel might be called upon to collaborate in the efforts to counter illegal export, dumping, and dismantling of hazardous waste. Military installations should continue reviewing and improving their handling of outdated or waste electronic materiel to ensure that it is being disposed of in the most environmentally safe manner, including reuse and recycling.

Sources:

Smuggling Europe's Waste to Poorer Countries

<http://www.nytimes.com/2009/09/27/science/earth/27waste.html>

Mafia 'sank ships of toxic waste'

<http://news.bbc.co.uk/1/hi/8257912.stm>

Set world standards for electronics recycling, reuse to curb e-waste exports to developing countries

<http://www.physorg.com/news172237477.html>

435 European Commission to Strengthen Bio-Waste Management*Military Implications:*

[Similar to previous on this issue] The military stationed in the EU region should increase its biowaste management practices and be prepared to comply with eventual new targets.

Sources:

New Commission strategy aims to get even more from bio-waste

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/578&format=HTML&aged=0&language=EN&guiLanguage=en>

New Commission strategy aims to get even more from bio-waste

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/578&format=HTML&aged=0&language=EN&guiLanguage=en>

436 Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and Toxic Waste Threat*Military Implications:*

Military units in the region—if not already called upon—should consider providing guidance and support in designing and implementing the frameworks.

Sources:

Governments seek to avoid radioactive catastrophe in Central Asia

<http://content.undp.org/go/newsroom/2009/june/governments-seek-to-avoid-radioactive-catastrophe-in-central-asia.en>

Central Asian Nations Seek to Reduce "Dirty Bomb" Threat

http://gsn.nti.org/gsn/nw_20090630_8549.php

IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS**438 EU to Introduce New Environmental Index***Military Implications:*

Those involved with improving the military's role in environmental sustainability should contact the European personnel working on the environmental sustainability index to explore applications for a military environmental sustainability index. The new index of environmental sustainability could be an indicator for enforcement of current, and creation of new, environmental regulations.

Sources:

Environment: Measuring progress in a changing world

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1286>

Brussels wants wider measure of well-being than mere GDP

<http://news.my.msn.com/business/article.aspx?cp-documentid=3559371>

439 European Commission Creates New Directorate-General for Climate Action*Military Implications:*

It is expected that the new DG will enhance EU efforts on the international arena and at home for tougher measures for addressing climate change-related issues. Relevant military personnel with environmental security-related responsibilities should explore liaison with this new office to anticipate policy changes and inform contractors of possible new regulations and enforcement measures.

Source:

Commission creates two new Directorates-General for Energy and Climate Action

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/164&format=HTML&aged=0&language=EN&guiLanguage=en>

440 European Agency for the Cooperation of Energy Regulators to Become Operational in March 2011*Military Implications:*

[Similar to previous on related issues] Military stationed in EU member states should review their actions to support the EU energy policy and seek opportunities to apply the Army Strategy for the Environment. Energy-related purchase contracts could be affected.

Sources:

European energy agency could form super-regulator

<http://www.guardian.co.uk/business/2010/mar/29/european-commission-energy-regulator>

Ljubljana designated as seat of the Agency for the Cooperation of Energy Regulators

<http://www.eumonitor.net/modules.php?op=modload&name=News&file=article&sid=141533&mode=thread&order=0&thold=0>

441 UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty*Military Implications:*

The military should stay abreast of these developments as they relate to planning and materiel. It should also assess all the opportunities to facilitate the NPT negotiations and international cooperation to improve nuclear safety, as well as recommend policy, training, and institutional or physical changes to implement the resolution.

Sources:

U.N. Security Council Approves Nuclear Resolution

http://gsn.nti.org/gsn/nw_20090924_4766.php

Fact Sheet on the United Nations Security Council Summit on Nuclear Nonproliferation and Nuclear Disarmament UNSC Resolution 1887

http://www.whitehouse.gov/the_press_office/Fact-Sheet-on-the-United-Nations-Security-Council-Summit-on-Nuclear-Nonproliferation-and-Nuclear-Disarmament-UNSC-Resolution-1887/

442 New Measure to Enforce Maritime Environmental Protection*Military Implications:*

The new adopted and proposed measures do not seem to exempt military craft or activities. The Navy and its contractors should explore this omission and be prepared to comply with new anti-pollution regulations.

Source:

IMO environment Committee makes progress. MEPC – 60th session: 22-26 March, 2010
http://www.imo.org/Newsroom/mainframe.asp?topic_id=1859&doc_id=12724

⁴⁴³ *Military Implications:*

Military components in the areas should take note of these measures and the way they might affect military operations (e.g., at Diego Garcia.)

Sources:

UK sets up Chagos Islands marine reserve

<http://news.bbc.co.uk/2/hi/science/nature/8599125.stm>

Ministers Launch Rejuvenated Nairobi Convention to Protect the Western Indian Ocean's Environment

<http://www.unep.org/environmentalgovernance/News/Press-Release/tabid/427/language/en-US/Default.aspx?DocumentID=620&ArticleID=6521&Lang=en>

⁴⁴⁴ **Observation and Information System for the World's Oceans to be Created**

Military Implications:

Appropriate military personnel should establish liaison with these projects to take advantage of their eventual capabilities for global surveillance of the maritime environment and to provide know-how and support. These systems are likely to contribute to enforcing existing maritime regulations, as well as to trigger eventual new ones based on new data to be collected.

Sources:

'Assessment of Assessments' (of the oceans)

http://www.unga-regular-process.org/index.php?option=com_content&task=view&id=18&Itemid=20

OceanObs'09 Conference

<http://www.oceanobs09.net/>

Ocean Observatories Initiative Receives Award

<http://www.oceanleadership.org/2009/ocean-observatories-initiative-receives-award/>

⁴⁴⁵ **Consumer's Handbook for Reducing Solid Waste**

Military implications:

Military personnel responsible for facilities management should see if this handbook has useful new suggestions to improve or add to current solid waste storage and disposal protocols. It could be considered for distribution to on-base residents.

Sources:

Consumer's Handbook for Reducing Solid Waste

<http://www.epa.gov/osw/wycd/catbook/index.htm>

446 Summary of European Battery Regulations Released*Military Implications:*

Military logistics personnel in the European Theater should be familiar with these environmental regulations as they may apply to local suppliers.

Sources:

Enhesa Releases Battery Report 2009 Will Santa Claus break the law? The European Batteries Directive

http://www.enhesa.com/en/docs/PressRelease_Enhesa_Batteries_final_200912.pdf

Enhesa Batteries Report 2009

http://www.enhesa.com/en/service/docs/Enhesa_Batteries_Report_2009.pdf

447 World Bank Development Indicators Database Available Free*Military Implications:*

The military should consider creating a World Environmental Security State of the Future Index using relevant World Bank data. Such an integrated ten-year index could be used as a policy tool to identify which variables - if changed - have the greatest impact on the overall environmental security of the world.

Source:

WDI <http://data.worldbank.org/>

INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS**449 More than 30 New International Food Safety Standards Adopted***Military Implications:*

Military personnel responsible for food standards (procurement and preventive health) should review these new standards. Implications relate not only to internal standards, regulations, and procedures, but also to possible new tools for enhancing safety and quality of food acquired worldwide.

Source:

More than 30 new food safety standards adopted

http://www.who.int/mediacentre/news/releases/2009/food_standards_20090706/en/index.html

450 Software Standards to Connect Data Globally*Military Implications:*

Such standards are necessary to aid the military in monitoring environmental change on a global basis to help anticipate future threats and opportunities. The military should consider establishing

contact with both of these efforts to offer its assistance in their development, and also to take advantage of them when they are operational.

Sources:

SANY Project

<http://sany-ip.eu/>

Open shop for environmental data

<http://www.physorg.com/news177671377.html>

DataONE

<http://dataone.org>

DataONE helping scientists deal with data deluge

<http://www.physorg.com/news177765736.html>

⁴⁵¹ **Emerging International Packaging Standards to Reduce Environmental Footprints**

Military Implications:

The military and its contractors should monitor the development of the new standards for potential impacts on military logistics operations, and to plan for any necessary changes.

Sources:

Creation of International Packaging Standards Begins

<http://www.greenbiz.com/news/2009/12/10/creation-international-packaging-standards-begins>

TC 122/SC 4 Packaging and Environment

http://www.iso.org/iso/standards_development/technical_committees/other_bodies/iso_technical_committee.htm?commid=52082

⁴⁵² **Only Very Low-Energy Buildings to Be Built in EU after 2020**

Military Implications:

[Similar to previous on this issue] The military stationed in the EU region should increase its biowaste management practices and be prepared to comply with eventual new targets.

Source:

New energy labels for household appliances; low-energy buildings from 2020

http://www.europarl.europa.eu/news/expert/infopress_page/051-74642-137-05-21-909-20100517IPR74641-17-05-2010-2010-false/default_en.htm

POLLUTION

⁴⁵⁴ **The Oil Spill Likely to Initiate International Regulations Discussions and Accelerate Alternative Energy Developments**

Military Implications:

Alternative scenarios of international oil spills should be created to explore applications for military logistical capacities. This disaster should be used to further awareness of the Army Strategy for the Environment, accelerate DARPA energy R&D and implementation of proven green energy technologies. Since BP is the single largest supplier of fuel to DOD, DOD should explore its role in future hearings to improve government standards affecting deepwater drilling for its suppliers and contractors.

Sources:

BP Risks Big Fines and Loss of Major U.S. Contracts

<http://online.wsj.com/article/SB10001424052748703630304575270822261954614.html>

A Proxy War in Peru

http://www.foreignpolicy.com/articles/2010/05/19/a_proxy_war_in_peru

Nigeria: Delta Communities Cry Out Over Oil Spillage

<http://allafrica.com/stories/201006010104.html>

Lawyers lining up for class-action suits over oil spill

<http://www.washingtonpost.com/wp-dyn/content/article/2010/05/16/AR2010051603254.html>

BP Oil Spill Could Happen Anywhere: Norway

<http://planetark.org/wen/57879>

⁴⁵⁵ **EPA Warnings on Various Potential Health Hazards**

Military Implications:

Military installations in potentially affected areas or buildings should be prepared to work with the local communities for meeting health standards.

Sources:

EPA Lists Areas Violating Daily Air Pollution Requirements 31 locations not meeting 24-hour fine particle standards

<http://yosemite.epa.gov/opa/admpress.nsf/6424ac1caa800aab85257359003f5337/ee3e8db020a8b8ed85257649005b266c!OpenDocument>

EPA Designates Areas as Attainment and Nonattainment for the 24-Hour PM_{2.5} National Air Quality Standards

<http://www.epa.gov/pmdesignations/2006standards/regs.htm#4>

PCBs in Caulk in Older Buildings

<http://www.epa.gov/pcbsincaulk>

⁴⁵⁶ **Studies Show Increased Hazards from Some Types of Airborne Particles**

Military Implications:

Military personnel concerned with airborne pollutants should to follow these researches in order to properly prioritize abatement efforts. Additionally, more conclusive evidences of potential harm from some particulate matters might trigger modifications to related international regulations.

Source:

Heavy metal: Some airborne particles pose more dangers than others

<http://www.environmentalhealthnews.org/ehs/news/metal-particles>

⁴⁵⁷ Study Reveals Extensive Danger from Lead in Foreign Paints

Military Implications:

Military procurement and contractors should review their paint purchases, inventories, and uses to ensure that the products meet proper U.S. safety standards. Preventive health entities should take the initiative to monitor procurement and uses and direct corrective actions when unsafe products are found.

Source:

Lead-Based Consumer Paint Remains a Global Public Health Threat

<http://healthnews.uc.edu/news/?/8982>

⁴⁵⁸ Low-fume Paint Requirements Spread

Military Implications:

Military research, procurement, and maintenance operations should review their paint purchases, inventories, and uses to ensure that they conform to these new restrictions.

Sources:

State rolls out new paint law to reduce harmful fumes

<http://www.dailyherald.com/story/?id=308600&src=119>

Celanese Introduces EcoVAE™ Emulsions for Low to No VOC, Eco-Friendly Paints in Asia

<http://www.pr-inside.com/celanese-introduces-ecovae-emulsions-for-r937682.htm>

⁴⁵⁹ European Environment Agency Draws First Map of Europe's Noise Exposure

Military Implications:

It is reasonable to speculate that the map will provide a tool for the population to request more stringent noise regulations and their enforcement. In anticipation of this the military stationed in Europe should explore methods of reducing noise pollution.

Source:

EEA draws the first map of Europe's noise exposure

<http://www.eea.europa.eu/pressroom/newsreleases/eea-draws-the-first-map-of-europe2019s-noise-exposure>

⁴⁶⁰ Greenhouse Gas Emissions Increase Ocean Noise Pollution

Military Implications:

Although debate over the potential harmful effects of sonar continues, new research on the consequences of ocean pollution from shipping and greenhouse gas emissions might accelerate negotiations for new regulations.

Sources:

Ocean noise pollution turns up with greenhouse gas emissions

http://www.starbulletin.com/news/20091227_Ocean_noise_pollution_turns_up_with_greenhouse_gas_emissions.html

Oceans becoming noisier thanks to pollution

http://www.khaleejtimes.com/DisplayarticleNew.asp?section=todaysfeatures&xfile=data/todaysfeatures/2009/December/todaysfeatures_December37.xml