Millennium Project, WFUNA
http://www.millennium-project.org

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY

Control No. (TCN) 08152 with Battelle Chapel Hill Operations for the U.S. Army Environmental Policy Institute

FEBRUARY 2010 REPORT

Note to Readers: Pages 1-17 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 18.

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
FEB 2010		**00-00-2010 to 00-00-2010**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Worldwide Emerging Environmental Issues Affecting the U.S. Military. February 2010	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **The Millennium Project ,4421 Garrison Street, N.W. ,Washington,DC,20016-4055**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**26**	

Item 1. 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.]

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/

Item 2. First Joint Meeting of the Main Conventions on Hazardous Chemicals to Improve International Environmental Governance

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 (GCSS-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.]

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/

Item 3. 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.

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

Item 4. 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.

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 "bootprint." 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

Item 5. 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.

Military Implications:
AFRICOM should seek liaison with leaders of the Afro-Arab action plan to explore potential collaboration on environmental security planning.

Sources:
African Union Press Release
http://www.africa-union.org/root/au/Conferences/2010/feb/afroarab/Afro%20Arab%20PR%203.doc
Background Document on the Status and Prospects of Agricultural Development and Food Security in Africa and the Arab World
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

Item 6. Technological Advances with Environmental Security Implications

6.1 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.

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

6.2 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.

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

6.3 Increasing Energy Efficiency Technologies

6.3.1 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.]

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)

6.3.2 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.

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

6.3.3 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.

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

6.3.4 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, $Fe_2S_2(CO)_6$, 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.

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.)

6.3.5 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.

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/nn901148m

6.3.6 ARPA-E Awards Funding to 37 Transformational Energy Projects

The DOE's Advanced Research Projects Agency-Energy ("ARPA-E") awarded $151 million in funding to 37 transformational energy projects, including; for example, new thermoelectric power generation devices.

Military Implications:

The military should review these projects to determine which should be followed up as being of significance in meeting military requirements for environmentally friendly power supplies for field systems, including environment-sensing devices themselves.

Source:

Bold, Transformational Energy Research Projects Win $151 Million in Funding
www.energy.gov/news2009/8207.htm

Item 7. Updates on Previously Identified Issues

7.1 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 cupper. [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.]

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

7.2 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.]

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

7.3 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 CO_2 emissions. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.]

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

7.4 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).

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

7.5 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 CO_2 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.

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

7.6 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. [Related items: *Arctic Opens to International Commercial Use* in January 2010 and others in previous environmental security reports.]

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

7.7 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. [Related item: *A New Water Management Tool* in September 2009 environmental security report.]

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

7.8 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.

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

7.9 Climate Change

7.9.1 Scientific Evidence and Natural Disasters

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 2ºC (3.6ºF) 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 5.9ºC (42.62ºF), 1.5ºC (2.7ºF) higher than "normal" (an average over several decades.). Chinese climatologists report that temperatures in Tibet rose by an average 0.32ºC (0.58ºF) per decade since 1961, when meteorological records began, which is considerably higher than the global average of 0.2ºC (0.36ºF) per decade.

7.9.2 Food and Water Security

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.

7.9.3 Health

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.

7.9.4 Melting Glaciers

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 3-4ºC (37.4-39.2ºF) 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.

7.9.5 Migration

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.

7.9.6 Adaptation

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.

7.9.7 Climate Modeling and Scenarios

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 2.7ºF to 5.4ºF warmer and summers 3.6ºF to 10.8ºF 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.

7.9.8 Post-Copenhagen Negotiations

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 CO_2 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.

Military Implications:
[Same as previous 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: (see a more expanded list in the Appendix)
More Ambition Needed if Greenhouse Gases are to Peak in Time, Says New UNEP Report
http://hqweb.unep.org/Documents.Multilingual/Default.asp?DocumentID=612&ArticleID=6472&l=en&t=long
WA drought is 'proof of climate change'
http://news.ninemsn.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
Thirty-third session of the Governing Council of IFAD 17-18 February 2010: Programme of events
http://www.ifad.org/events/gc/33/index.htm
Tofu can harm environment more than meat, finds WWF study
http://www.timesonline.co.uk/tol/news/environment/article7023809.ece
EU biofuels significantly harming food production in developing countries
http://www.guardian.co.uk/environment/2010/feb/15/biofuels-food-production-developing-countries
Egypt's fertile Nile Delta falls prey to climate change
http://www.seeddaily.com/reports/Egypts_fertile_Nile_Delta_falls_prey_to_climate_change_999.html

Over 7 million people in Niger facing food insecurity owing to bad harvest, warns UN
http://www.un.org/apps/news/story.asp?NewsID=33860&Cr=+niger+&Cr1=
Gender, Climate Change and Health. Draft Discussion Paper
http://www.who.int/globalchange/publications/reports/final_who_gender.pdf
Climate change melts Antarctic ice shelves: USGS
http://www.reuters.com/article/idUSTRE61L5OH20100222
Arctic melt to cost up to $24 trillion by 2050: report
http://www.reuters.com/article/idUSTRE6145M520100205
Drought Blights Syrian Villages, Residents Dying of Hunger
http://www.ens-newswire.com/ens/jan2010/2010-01-27-01.html
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/
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
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
The Climate Scoreboard
http://climateinteractive.org/scoreboard

7.10 Nanotechnology Safety Issues

More detailed descriptions of the following nanotechnology issues are in the Appendix

- Russia Sets Up Nanotech Risk Assessment and Regulation Cooperation (more)
- Russia and Finland to Cooperate on Nanotech Regulation Development (more)
- Australia Sets Up Framework for Safe Nanotech (more)
- India to Establish Nanotechnology Regulatory Board (more)
- Detailed Report on ICPC-NanoNet Project (more)
- EC Publishes Paper on Options for Framing Public Policy on Nanotech (more)
- Paper Reviews Nanotech Remediation of Waste Sites (more)
- ENT (Environmental Nano Technologies) Magazine Features Nanotech for the Environment (more)
- Worldwide Nanotech Labs Deficient in EHS Protection reveals survey (more)
- "Toxicology of the Tiny" (more)
- New Technique May Reduce Silver Nanoparticle Hazard (more)

Item 8. Reports and Information Suggested for Review

8.1 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."

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/department-defense-looks-green

8.2 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*.

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/

8.3 IPCC Issues Its First Newsletter

The Intergovernmental Panel on Climate Change (IPCC) has issued its first newsletter. The January issue presents an introduction on the Panel's work related to the Fifth Assessment Report (AR5), due to be completed in 2013-14, as well as on the preparation of two Special Reports—on extreme events and disasters, and on renewable energy.

Military Implications:
In addition to offering an update on new climate change-related findings and IPCC studies for the next Assessment Report, the newsletter is a good source of information for trends in addressing climate change-related issues, which might shape new international negotiations. The military should offer relevant press releases about progress on responses to climate change.

Source:
IPCC Newsletter (January 2010)
http://www.ipcc.ch/pdf/Newsletter/IPCC_newsletter_2010_issue_1.pdf

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

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

Status of ratifications of the Cluster Munitions Convention as of February 16, 2010 (http://www.stopclustermunitions.org/treatystatus):
Countries Parties: Austria, Holy See, Ireland, Mexico, New Zealand, Norway (states that led the "Oslo Process"), Albania, Croatia, Lao PDR, Sierra Leone, and Zambia (states affected by cluster munitions), Belgium, Denmark, France, Germany, Japan, Moldova, Montenegro, and Slovenia (cluster munitions stockpiles), Spain (the first signatory country that completed destruction of its cluster munitions stockpile), Burkina Faso, Burundi, Luxembourg, Macedonia, Malawi, Malta, Nicaragua, Niger, San Marino, and Uruguay.
A total of 104 countries have signed the Convention.

7.9 Climate Change

7.9.1 Scientific Evidence and Natural Disasters
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.ninemsn.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

7.9.2 Food and Water Security
Thirty-third session of the Governing Council of IFAD 17-18 February 2010: Programme of events
http://www.ifad.org/events/gc/33/index.htm
Tofu can harm environment more than meat, finds WWF study
http://www.timesonline.co.uk/tol/news/environment/article7023809.ece
Becoming vegetarian 'can harm the environment'
http://www.telegraph.co.uk/earth/environment/climatechange/7219223/Becoming-vegetarian-can-harm-the-environment.html
EU biofuels significantly harming food production in developing countries
http://www.guardian.co.uk/environment/2010/feb/15/biofuels-food-production-developing-countries
Action Aid "Meals per gallon: the impact of industrial biofuels on people and global hunger":
http://www.actionaid.org/micrositeAssets/eu/assets/aa_biofuelsreportweb100210.pdf

Report: 38 per cent of land faces desertification
http://www.businessgreen.com/business-green/news/2257707/report-per-cent-land-faces
Britain facing food crisis as world's soil 'vanishes in 60 years'
http://www.telegraph.co.uk/earth/agriculture/farming/6828878/Britain-facing-food-crisis-as-worlds-soil-vanishes-in-60-years.html
Egypt's fertile Nile Delta falls prey to climate change
http://www.seeddaily.com/reports/Egypts_fertile_Nile_Delta_falls_prey_to_climate_change_999.html
Over 7 million people in Niger facing food insecurity owing to bad harvest, warns UN
http://www.un.org/apps/news/story.asp?NewsID=33860&Cr=+niger+&Cr1=

7.9.3 Health
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

7.9.4 Melting Glaciers
Greenland ice loss driven by warming seas: study
http://www.khaleejtimes.com/DisplayArticle08.asp?xfile=data/environment/2010/February/environment_February34.xml&section=environment
Climate change melts Antarctic ice shelves: USGS
http://www.reuters.com/article/idUSTRE61L5OH20100222
Arctic Treasure: Global Assets Melting Away
http://www.pewtrusts.org/our_work_report_detail.aspx?id=57161
An Initial Estimate of the Cost of Lost Climate Regulation Services Due to Changes in the Arctic Cryosphere
http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Protecting_ocean_life/Cost%20of%20Warming%20Arctic-FINAL%202%205%2010.pdf
Pew Environment Report Says Melting Arctic Could Cost $2.4 Trillion by 2050
http://www.pewtrusts.org/news_room_detail.aspx?id=57159
Arctic melt to cost up to $24 trillion by 2050: report
http://www.reuters.com/article/idUSTRE6145M520100205
Melting ice alters way of life in Iqaluit
http://www.ft.com/cms/s/0/ffdb6c92-14e4-11df-8f1d-00144feab49a.html?nclick_check=1
Arctic melting to cost $2.4 trillion U.S. by 2050: Study
http://www.montrealgazette.com/technology/Arctic%20melting%20cost%20trillion%202050%20Study/2527615/story.html

7.9.5 Migration
SYRIA: Over a million people affected by drought
http://www.irinnews.org/Report.aspx?ReportId=88139
Drought Blights Syrian Villages, Residents Dying of Hunger
http://www.ens-newswire.com/ens/jan2010/2010-01-27-01.html

7.9.6 Adaptation
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/

7.9.7 Climate Modeling and Scenarios
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

7.9.8 Post-Copenhagen Negotiations
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=
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

7.10 Nanotechnology Safety Issues
More detailed descriptions of the nanotechnology issues

7.10.1 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".

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

7.10.2 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.

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

7.10.3 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

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

7.10.4 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.

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

7.10.5 Detailed Report on ICPC-NanoNet Project
An article prepared for *NanoWerk Spotlight* presents in updated and expanded detail the various information services available through the EU FP7 ICPC-NanoNet project (ICPC is the International Cooperation Partner Countries to the EU). These include: an electronic archive of nanoscience publications (www.nanoarchive.org); electronic databases of nanoscience organizations and networks, and researchers and stakeholders (www.icpc-nanonet.org); annual reports on nanoscience developments in eight ICPC regions; several online networking tools; and annual workshops in the EU, China, India, and Russia. [Related item: *Regional Reports on Nanotech Issued by International Group* in August 2009 environmental security report]

Military Implications:
Relevant military personnel need to be aware of the ICPCNanoNet repository as a source of professionally legitimate information on the state of research in nanotech around the world.

Source:
International cooperation in environmental nanotechnology - example water purification
http://www.nanowerk.com/spotlight/spotid=14971.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

7.10.6 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."

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&teaserId=
Understanding Public Debate on Nanotechnologies. Options for Framing Public Policy
http://www.innovationsgesellschaft.ch/media/archive2/tv_radio_und_printartikel/Debate_nano_100203.pdf

7.10.7 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/

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://ehsehplp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.0900793

7.10.8 New Magazine Features Nanotech for the Environment

A new magazine, ENT (Environmental Nano Technologies), has appeared, describing itself as an "…international magazine covering the latest research, applications, and opinions in the field of nanotechnology for the environment - alternative energies, water, air and soil purification." It will include digital archives, an interactive website, and the possibility of participating in Patent Auctions.

Military Implications:
The ENT is a new reference source on the state of nanotech research around the world.

Source:
Environmental Nano Technologies Magazine
http://www.entmagazine.com/

7.10.9 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.

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)

7.10.10 "Toxicology of the Tiny"

A senior writer at the Bren School of Environmental Science and Management at UC Santa Barbara, James Badham, has written a brief article summarizing the current state of nanotoxicology and providing a number of links to work in the field. It offers an excellent review of issues in the subject and sources for further information.

Military Implications:

Relevant military personnel should consider the article as an additional resource on the state of nanotoxicology and assessment of eventual implications on the evolution of regulations in the field.

Source:

The race to know how nanoparticles affect living things is on, even as the use of those particles is increasing exponentially
http://www.miller-mccune.com/science-environment/toxicology-of-the-tiny-7171/

7.10.11 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.

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