

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

MARCH 2009 REPORT

Note to Readers: Pages 1-14 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 15.

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Item 1. Climate Change Triggers Redrawing Swiss-Italian Borders

Switzerland and Italy are cooperating in redrawing their national borders in the Matterhorn mountain area, due to melting Alpine glaciers that previously set the border lines. The new proposal considers the rocks rather than glaciers as border criteria. The Swiss-Italian border change will not affect any inhabited area. Franco Narducci, of Italy's opposition Democratic Party, who is preparing the bill for redefining the frontier, said that similar negotiations will be proposed to France and Austria. Redrawing these borders creates a precedent with implications for other effects of climate change in other regions such as the Arctic and Antarctic regions, and the Low-lying Island States.

Military Implications:

Early analysis of vulnerability to eventual national border changes and preliminary negotiations should be considered as part of conflict prevention strategies in order to avoid potentially escalating situations. Relevant military personnel and those stationed in regions with potential disputes should contact their counterparts to offer assistance with the negotiations, if needed.

Sources: (a more expanded list in the [Appendix](#))

Melting snow prompts border change between Switzerland and Italy

<http://www.independent.co.uk/news/world/europe/melting-snow-prompts-border-change-between-switzerland-and-italy-1653181.html>

Climate changes Europe's borders – and the world's

<http://www.newscientist.com/article/dn16854-climate-changes-europes-borders--and-the-worlds.html>

Item 2. Water-related Rights and Security Addressed by 5th World Water Forum

25,000 attended the 5th World Water Forum in Istanbul, March 16-22, 2009. Several theme-based and regional sessions addressed water resources, security implications, and risk management in the context of global change—mainly the effects of climate change and related economic crises. Some suggestions made at the Forum include: constitution of a “World Water Parliament”; stricter zoning laws; linking water and energy efficiency initiatives; proactive policy processes for addressing disasters and reducing water-related conflicts; the need to respect international law protecting water resources during conflict; and recognizing the right to water and sanitation as a human need. Documents launched or adopted by the Forum include the Ministerial Declaration, “Water in a Changing World” (the 3rd World Water Development Report), and “Managing Water for All: An OECD Perspective on Pricing and Financing by OECD.” (See more details in the [Appendix](#))

Meantime, the NATO report “New Horizons,” highlighting access to water as an aspect of energy and resource scarcity, notes that the countries of the Middle East and Africa already suffering from absolute water scarcity “will most likely be joined by China, India, Pakistan and South Africa around 2025.”

Military Implications:

Just as major military resources supported the development and deployment of nuclear weapons as a deterrent to war, so too consideration should be given to adding major resources to support development and deployment of water solutions to prevent water scarcity-induced wars. Military personnel with environmental security responsibilities should consider the World Water Forum's

recommendations, and explore collaboration possibilities with governments for designing preventive policies and strategies. Also, it should investigate how the recognition of access to clean water as a human right (which is gaining increasing global support and is already adopted by some countries) would affect military-to-military program priorities and training.

Sources: (a more expanded list in the [Appendix](#))

Summary of the 5th World Water Forum

<http://www.iisd.ca/download/pdf/sd/yimbvo182num23e.pdf>

NEW HORIZONS. Finding a path away from NATO's de-solidarisation

<http://www.natonewhorizons.org/NewHorizons-DigitalEdition.pdf> (14MB file)

Item 3. Environmental Early Warning Systems with Web Crawlers

Web crawlers (“software programs that browse the World Wide Web in a methodical, automated manner”) could serve as part of an early warning system for changes that may indicate impending ecological/environmental problems, points out an article by researchers from the Stockholm Resilience Centre at Stockholm University and the University of East Anglia. They suggest, “web crawlers can collect information on the drivers of ecosystem change, rather than the resultant ecological response, . . . future early warning systems can make use of the recent insight that shows that ecosystems sometimes ‘signal’ a pending collapse, . . . [and the crawlers] may find information that describes ecological changes at small scales, which may warn of similar shifts in other locations”

Military Implications:

If not already, the military should include this resource into its scanning process for identifying likely and/or evolving environmental problems with potential security implications.

Sources:

Doing it online: Internet can detect eco-crises

<http://www.stockholmresilience.org/research/researchnews/doingitonlineinternetcandetectecocrises.5.589e653711f5b17101b8000415.html>

Can information and communication technology help us save the planet? (Blog)

<http://resilienceinnovation.blogspot.com/>

Can web crawlers revolutionize ecological monitoring? (abstract)

<http://www.esajournals.org/doi/abs/10.1890/070204>

Crawling the Web to Foretell Ecosystem Collapse

<http://blog.wired.com/wiredscience/2009/03/ecodatamining.html>

Item 4. Future Lithium Dependency Raises New Energy Security Concerns

World demand for lithium is growing rapidly. It is the key element of improved batteries for electric and hybrid vehicles, cell phones, laptops, etc. today. Bolivia has nearly half the world's lithium reserves and will build lithium batteries domestically. Allegedly, some attempts by US, Japanese and French electric car makers to obtain lithium concessions failed. Official talks of plans for establishing a lithium cartel similar to OPEC to control the resource raise new energy security concerns. Current large lithium producers are Argentina (about 50% of current world production), Chile, China, and Australia. However, at the recent Lithium Market and Supply

conference held in Santiago, Chile, it was said that there is plenty of lithium supply to meet demand for the foreseeable future. Considering the potential energy and environmental security implications of access to lithium reserves, it is wise to develop alternative battery technologies, such as those based on sodium nickel chloride or zinc-air, that do not face resource depletion or restriction issues. (Reportedly, Toyota and Germany's RWE are focusing R&D on zinc-air batteries.)

Military Implications:

Since the countries holding the bulk of the world's lithium may not necessarily prove to be allies, alternative sources and technologies should be sought. The military should focus and intensify efforts to support technologies that use abundant or renewable energy, avoiding resource monopolies or depletion with inherent political and security implications.

Sources: (see a more expanded list in the [Appendix](#))

Bolivia pins hopes on lithium, electric vehicles

<http://www.physorg.com/news155115838.html>

Mineral wealth, political weapon. Morales wields control of nation's lithium, uranium as cudgel

<http://www.washingtontimes.com/news/2009/feb/10/mineral-wealth-political-weapon/>

Peak Lithium: Will Supply Fears Drive Alternative Batteries?

<http://blogs.wsj.com/environmentalcapital/2009/02/03/peak-lithium-will-supply-fears-drive-alternative-batteries/>

Item 5. Technological Advances with Environmental Security Implications

5.1 New Air Quality Evaluation Tool

According to a news story in Science Daily "The Grupo de Modelos y Software para el medio Ambiente of the Facultad de Informática at the Universidad Politécnica de Madrid has developed a very sophisticated tool (OPANA) that estimates the impact of air quality on the health of citizens using last generation models. ... [It produces] extremely precise measurements of the concentration of a certain atmospheric contaminant that a person breathes in a determined time and place, from a particular source (an industry, an incinerator, a motorway, etc.). It is possible to determine the consequent impact under almost any circumstances or distance from the source." The results require the input of accurate data on local topography and land use, meteorology, and, most importantly, the estimated emissions in the area.

Military Implications:

The military should investigate the use of this tool for modeling and managing chemical and biological warfare incidents and in studies of the environmental impact of new projects.

Sources:

New Tool For Study Of Air Quality Developed

<http://www.sciencedaily.com/releases/2009/03/090311085406.htm>

The evaluation of the air quality impact of an incinerator by using MM5-CMAQ-EMIMO modeling system: North of Spain case study (abstract)

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V7X-4SBYYGS-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_view=c&_acct=C000050221&_version=1&_urlVer=0&_userid=10&md5=7cd8a3dfb80125e265f078e654526891

5.2 New Detection and Cleanup Techniques

5.2.1 Soil Bacterium May Convert Toxic Metals to Harmless Form

An international group of scientists at the Ohio State University, Columbus have published an on-line paper describing how the bacterium *Shewanella oneidensis*, found in soil, including nuclear waste dumps, breaks down metal oxides to chemically extract oxygen, leaving behind a non-soluble, and therefore harmless, residue.

Military implications:

Although more R&D will be required to bring this technique to a point of practical application, the military should become familiar with this line of research for its possible use in environmental cleanups.

Sources:

Antibody-recognition force microscopy shows that outer membrane cytochromes OmcA and MtrC are expressed on the exterior surface of *Shewanella oneidensis* MR-1

<http://aem.asm.org/cgi/content/abstract/AEM.02108-08v1>

Common Soil Bacteria Could Clean Up Nuclear Contamination

<http://www.ens-newswire.com/ens/mar2009/2009-03-17-092.asp>

5.2.2 Carbon Nanotube Adsorbents Remove Water Impurities

Prof. S. Ramaprabhu of the Alternative Energy and Nanotechnology Laboratory and Department of Physics at the Indian Institute of Technology, Madras, has led research resulting in the filing of a patent application for a nanocomposite adsorbent that could treat polluted wastewater from industrial plants and other sources, eliminating viruses, bacteria, toxic metal ions, and other organic molecules, although possibly requiring some modification for certain purposes. The news story reporting this also mentions water treatment research by Catalyx, Inc. of Anaheim CA, using reverse osmosis, and a project at the Center for Green Science at Carnegie Mellon Univ., based on tetra-amido macrocyclic ligand catalysts.

Military Implications:

The military should follow these developments as they proceed, to evaluate their applicability to water quality management in naturally and man-contaminated environments.

Sources:

IIT uses nanotech for cheap textile wastewater cleanup

<http://www.cleantech.com/news/4271/iit-uses-nanotech-cheap-textile-was>

Catalyx develops two-way osmosis to purify wastewater

<http://www.cleantech.com/news/4095/catalyx-develops-two-way-osmosis-wa>

Researchers claim chemistry breakthrough for environmental cleanup

<http://www.cleantech.com/news/3247/green-chemistry-catalyst-promises-safe-clean-alternative>

5.2.3 Robot “Fish” Evaluate Underwater Pollution

BMT Group, of Teddington, England, announced plans for initial testing of a new device for sensing underwater pollution. The device, developed by Prof. Huosheng Hu and associates at the School of Computer Science and Electronic Engineering, University of Essex, is physically modeled on a fish, is autonomous, requiring no external control, and communicates findings from its chemical sensors via a Wi-Fi connection at a charging point.

Military Implications:

The military should follow the development and testing of this device as an aid to pollution evaluation of bodies of water in both peacetime and conflict environments.

Sources:

Robotic fish: the latest weapon in the fight against water pollution

<http://www.bmt.org/News/?/3/0/510>

G8 Robotic Fish (video)

<http://www.youtube.com/watch?v=gSibkb6aKHM>

5.2.4 New Membrane for Energy-efficient Water Filtration

IBM Research (San Jose CA), Central Glass Co., Ltd. (Tokyo), the King Abdul Aziz City for Science and Technology (Riyadh), and the Univ. of Texas at Austin announced development of a new material for the energy-efficient membrane technology for water purification. The new formulation exhibits resistance to chlorine damage and performs well in mildly basic conditions, making it suitable for arsenic removal as well as water desalination.

Military Implications:

The military should explore the possibility of using this material in water supply systems for polluted environments.

Source:

IBM Makes Water Clean With Smarter, More Energy-Efficient Purification

<http://www-03.ibm.com/press/us/en/pressrelease/26921.wss>

5.3 Increasing Energy Efficiency Technologies**5.3.1 Photoelectric Energy Efficiency Increase by Photosynthesis-type Semiconductor Structure**

Prof. P. G. Lagoudakis of the School of Physics and Astronomy, University of Southampton (England), and colleagues have developed a colloidal nanocrystal quantum dot technique. It was suggested by natural photosynthesis structures, and is reported to yield a six-fold increase in photocurrent conversion efficiency compared to previous semiconductor devices.

Military Implications:

Although the developers say, “these are early days,” the military should follow development of this advance in photoelectric energy production.

Source:

Ultimate In 'Green' Energy: Plants Inspire New Generation Of Solar Cells

http://www.enn.com/top_stories/article/39402

5.3.2 Electrostatic Capacitors Offer Energy Storage Improvement

Prof. Gary Rubloff, director of the University of Maryland's NanoCenter, and his team have developed a family of nanotech-based electrostatic capacitors suitable for energy storage for such devices as electric vehicles. They are said to offer a 10 times improvement in energy storage density over current commercially available devices, while preserving high power and fast recharge characteristics.

Military Implications:

The military should follow this development as it proceeds toward suitability for practical use in environmentally friendly vehicles and systems.

Source:

For New Energy Options to Work, Better Storage Methods Needed

<http://www.earthtimes.org/articles/show/for-new-energy-options-to-work-better-storage-methods-needed,750464.shtml>

5.3.3 New Lithium-Ion Material Improves Recharging Time

Gerbrand Ceder and Byoungwoo Kang of the Dept. of Materials Science and Engineering at the Massachusetts Institute of Technology announced development of a new lithium-ion battery electrode material which they hope will give batteries a fast charging time equivalent to that of a supercapacitor. The material consists of nanospheres with a core of lithium iron phosphate and a surface of glassy lithium-phosphate, with the latter providing a fast path for electron travel during recharging.

Military Implications:

The military should keep in touch with this development, to be able to exploit it in energy storage systems if it proves practicable.

Sources:

Battery materials for ultrafast charging and discharging

<http://www.nature.com/nature/journal/v458/n7235/full/nature07853.html>

Batteries now included

http://www.economist.com/science/displaystory.cfm?story_id=13277371

Item 6. Updates on Previously Identified Issues

6.1 United States Bans Cluster Munitions Export

The US adopted legislation banning export from the United States of cluster munitions that leave behind more than 1% of their submunitions as duds, and conditions export on agreement of the receiving country that “cluster munitions will not be used where civilians are known to be present.” The law is seen by many as a move of the US closer to the Convention on Cluster Munitions that completely bans these weapons’ use, production, and trade. So far, 96 nations have signed and 5 ratified the Convention; thirty ratifications are required for its entry into force. [See also *The Cluster Munitions Treaty Signed by 94 Nations* in December 2008 and other related items in previous environmental security reports.]

Military Implications:

[Similar to previous on this issue] Although the U.S. has yet to support the Cluster Munitions Convention, the military should accelerate plans for the elimination of cluster bombs, as support for their prohibition continues to grow, including at home and among key NATO allies.

Sources: (a more expanded list in the [Appendix](#))

Cluster Munition Coalition welcomes U.S. Cluster Bomb Export Ban

<http://www.stopclustermunitions.org/news/?id=1393>

States must take action to ensure elimination of cluster munitions, says Migiro

<http://www.un.org/apps/news/story.asp?NewsID=30230&Cr=disarmament&Cr1=>

6.2 Russian Security Unit and Draft Law for Reinforcing Arctic Claims

The Arctic Group of Forces under the jurisdiction of the Russian Federal Security Service is planned to be deployed by 2020. Its mission will be to consolidate security and environmental protection in the area, as well as to participate in defining the Arctic Shelf “with respect to Russia’s national interests.” In the meantime, Russia is drafting a new law that would allow it to block foreign military vessels, deny entry to, or impose Russian escorting on, commercial ships deemed unsafe for navigation, and charge fees. NATO’s recent report, *New Horizons*, highlighting that the Arctic is becoming of “prime strategic importance,” notes that Russia will begin exploitation at a major oil and natural gas field in the Arctic in 2013—the deadline year set by the UN for the Arctic continental shelf demarcation. [See also *Arctic Security and Sovereignty Debate Continues* in January 2009, *Arctic Needs New International Regulations* in September 2008 and other items on the Arctic Debate in previous environmental security reports.]

Military Implications:

[Similar to previous on this issue] Negotiations for clear international regulations concerning the Arctic region are necessary to continue to reduce potential conflicts, and define new military roles in the region for both national security and protection of the ecosystems. Relevant military personnel should cooperate with their counterparts in other countries and international organizations for developing adequate strategies, regulations, and enforcement procedures.

Sources: (a more expanded list in the [Appendix](#))

Russia plans Arctic security unit

http://www.marketwatch.com/news/story/russia-plans-arctic-security-unit/story.aspx?guid={66566728-4484-46AD-BB8C-6EC140149C97}&dist=msr_1

Canada won't be 'bullied' by Russia's plans to protect Arctic interests: Cannon

<http://www.google.com/hostednews/canadianpress/article/ALeqM5irfclyLnfcwNnVS84Bw9CxVv7mQ>

6.3 ENVSEC to Expand Environmental Co-operation in South Caucasus

The Environment and Security Initiative (ENVSEC) held a meeting bringing together officials from Armenia, Azerbaijan, and Georgia with representatives from the OSCE, other international organizations, and environmental experts to discuss ways for expanding environment and security cooperation in the South Caucasus region. The ENVSEC helps capacity building to assess and address environmental threats to security in Southeastern Europe, Eastern Europe, Central Asia, and the South Caucasus. [See also *Environment and Security Program in the East-Caspian Region* in September 2007 environmental security report.]

Military Implications:

Military stationed in or responsible for relationships with the South Caucasus region should consider the ENVSEC priorities in their planning and actions, adjust the regional engagement plans accordingly, and also offer support to their counterparts to improve environmental aspects of military operations in the framework of the ENVSEC program.

Sources:

Expanded environmental co-operation in South Caucasus on agenda of OSCE-supported meeting in Tbilisi

http://finchannel.com/index.php?option=com_content&task=view&id=31073&Itemid=8

6.4 New Technologies Need New Regulations Systems

The “New Life, Old Bottles: Regulating First-Generation Products of Synthetic Biology” report published by the Woodrow Wilson International Center for Scholars, addresses the relevance of existing regulatory systems in view of developments in synthetic biology specifically and emerging new technologies generally. It argues that the current regulatory framework might not be adequate to address the challenges associated with conditions and properties related to emerging technologies (such as nanotechnology and synthetic biology); and, therefore, new sets of regulations might be needed. While specifically investigating the U.S. system, the principles and analysis are valid globally. [See also *The Woodrow Wilson International Center Opens Synthetic Biology Project* in January 2009, *Dangers Increase from “Amateur” Genetic Engineering; the Biological Weapons Convention to be Updated* in December 2008 and other similar issues in previous environmental security reports.]

Military Implications:

Since the risks raised by the development and use of synthetic biology and other new technologies are increasing, new international regulations seem inevitable. Relevant military personnel working on safety issues related to new technologies should consider collaboration with such initiatives as the Synthetic Biology Project and relevant international organizations for establishing international safety standards and should anticipate potential regulations in the planning of future R&D in these areas. Simultaneously, it should also investigate measures for identifying potential negative consequences and design protective procedures.

Sources:

New Life, Old Bottles: Regulating First-Generation Products of Synthetic Biology

http://www.synbioproject.org/process/assets/files/6319/nano_synbio2_electronic_final.pdf

Synthetic Biology Project—publication announcement

<http://www.synbioproject.org/library/publications/archive/synbio2/>

6.5 Canada Extends Toxic Substances Lists

Health Canada declared four chemicals with varied uses to be toxic to human health (but not toxic to the environment): 2-(2-Methoxyethoxy) ethanol (DEGME); 2-Methoxyethanol acetate (2-MEA); 2-methoxy-1-propanol; and C.I. Pigment Red 3. Actions to manage related hazards have been proposed or are under study. In January the government declared two types of siloxanes, D4 and D5, as toxic to the environment. Health and Environment Canada also determined that pigments yellow 34 and red 103, thiourea, isoprene, and oxirane were toxic to human health, and that 2,4,6-tri-tert-butylphenol or TTBP is an environmental toxin. [See also *New Chemicals Considered for Toxic Lists* in January 2009 environmental security report.]

Military Implications:

The military should review its use of these chemicals, if any, in anticipation of probable future regulatory actions by Canada and other jurisdictions.

Source:

4 chemicals used in consumer products slapped with toxic label

<http://www.canada.com/news/chemicals%20consumer%20products%20slapped%20with%20toxic%20label/1362478/story.html>

6.6 Global Fuel Economy Initiative Aims to Increase Cars' Fuel Efficiency 50% by 2050

The Global Fuel Economy Initiative was launched by a coalition of the FIA Foundation, the International Energy Agency, the International Transport Forum and UNEP to call on the global auto industry and governments to reduce by 50% emissions from cars by 2050, mainly by improving fuel efficiency. The report "50 by 50' Global Fuel Economy Initiative" explains that improving new car fuel efficiency by 50% could stabilize world emissions through 2050, and outlines a roadmap on how to achieve the goals, with interim targets for 2020 and 2030. An additional outcome is increased energy security, by reducing dependency on oil imports. The number of cars is expected to triple by 2050. The initiative was launched at the 79th international motor show held in Geneva, March 5-15, 2009. [See also *World Leaders Discuss Environmental Security Policies at Davos* in January 2008, *EU Renewable Energy Policy becomes Legally Binding* in December 2008 and other related items in previous environmental security reports.]

Military Implications:

The '50 by 50' initiative is likely to represent a base for discussions and setting binding targets for the global auto industry. The military should continue to collaborate with its contractors to speed up the introduction of fuel-efficient vehicles.

Sources: (a more expanded list in the Appendix)

'50 by 50' Global Fuel Economy Initiative

http://www.fiafoundation.org/50by50/Documents/50BY50_report.pdf

UN-backed roadmap for halving auto emissions unveiled in Geneva

<http://www.un.org/apps/news/story.asp?NewsID=30083&Cr=greenhouse&Cr1>

6.7 UK Could Seize Planes to Enforce European Emissions Trading Scheme

The UK Environment Agency will have increased power to seize assets from airlines that do not respect the new scheme to limit flights' carbon emissions in view of the European Emissions Trading Scheme for aviation. The measure is introduced in an effort to enforce regulations in the special case of airlines, which do not have fixed assets in the UK. [See also *Provisional Agreement for Including Aviation in the Emission Trading Scheme from 2012* in June 2008 and other similar items in previous environmental security reports.]

Military Implications:

It seems that, at this point, the regulation and UK Environmental Agency power apply only to commercial and private flights. Nevertheless, the military should explore potential impacts on its European operations and consult with allied military forces on the status of military exemptions.

Source:

Airlines that break emission rules could have planes seized

<http://www.guardian.co.uk/business/2009/mar/04/carbon-emissions-airlines-climate-change>

6.8 "Roving" Marine Protected Areas as Climate Change Affects Migration

Climate change affects weather patterns, ocean currents, and temperatures, which affect ecosystems and animals' migration; hence, areas set aside for wildlife protection may have to change as well. None of the over 4,500 marine protected areas worldwide have been designed factoring in climate change, say experts. Hence, scientists are speculating about possibilities of drawing "roving" protected areas as a function of changing conditions. Although technical advancements facilitate the task of identifying ecosystem changes, the issues of governance

might be a greater challenge. The current 0.7% of the world's oceans being designated as protected is far from the 20% to 30% by 2012 goal declared at the 5th World Parks Congress in 2003. [See also *Marine Protection to Increase* in June 2008 and other similar items in previous environmental security reports.]

Military Implications:

The Navy and any other military involved in marine operations should notify relevant authorities of any observed migratory changes and, as a precautionary measure, monitor the course of any new regulations to ensure compliance.

Source:

Parks that can move when the animals do

<http://features.csmonitor.com/environment/2009/03/04/parks-that-can-move-when-the-animals-do/>

6.9 Climate Change

Detailed descriptions of the following issues are in the [Appendix](#)

6.9.1 Scientific Evidences and Natural Disasters

Scientists agree that “worst case” scenarios are already becoming reality, and that by the end of the century the average temperatures might increase 6°C (10.8°F). Scientists warned that due to physiological limits of the human body, a temperature rise by 7°C (12.6°F) over pre-industrial levels would render many parts of the globe uninhabitable. A 10°C (18°F) rise would encompass the bulk of today's population. Another scientist says that an only 5°C (9°F) global warming over present temperatures might reduce the human population to 1 billion. Global warming might be further exacerbated by CO₂ released from the Antarctic Ocean because of changing wind patterns due to orbital shift. ([more](#))

6.9.2 Food and Water Security

By 2050 world population will reach 9.1 billion if the fertility rate continues to decrease, and 11 billion if it were to stay at the present level of 2.56—increasing demand for food and water in either case. Over the last 50 years, freshwater withdrawals have tripled and irrigation doubled due to population growth. Population growth to 8.3 billion by 2030 will increase food and energy demand by 50% and fresh water by 30%. Swift policy measures are needed to improve agriculture and consumption practices. For addressing the situation at the European level, a position of chief science adviser to the European Commission might be needed.

UN Secretary-General Ban Ki-moon, discussing the linkages between food security and climate change, stated that helping communities around the world adapt to climate change will be a key issue at the UN Climate Change Conference in December 2009.

The Water and Disaster Action Plan provides a tool for the UN System to mobilize and coordinate its efforts in assisting member States to face the challenge of natural disasters. ([more](#))

6.9.3 Melting Glaciers and Sea Ice

Over the past three decades, the average warming over the Arctic Ocean was 3°C, reaching even 5°C (9°F) in some parts where the ice has been lost, while the average global temperature has risen by less than 1°C (1.8°F). The lakes in Siberia are now five times larger than in 2006. Some potential consequences include increasing permafrost melting and runaway warming, and increasing fresh water flowing into the Arctic Ocean from the melting sea ice, glaciers, and

rivers. This in turn can change the ocean's conveyor current, with consequences on the Asian monsoon and rain patterns affecting food and water supply of a large part of world population.

Considering the rapidly melting ice sheets in Greenland and Antarctica, sea levels might be rising by 1 meter or more by 2100, twice as fast as forecasted by the IPCC. ([more](#))

6.9.4 Health

Changes in rainfall patterns and rapid urbanization increase dengue fever outbreaks in Asian countries such as Indonesia.

In North America, higher temperatures, humidity, and rainfall associated with climate change increase outbreaks of West Nile Virus infections; the pattern might get worse in coming decades. ([more](#))

6.9.5 Adaptation

Energy and environmental standards should be considered and shared with communities in security-related reconstruction and stabilization activities, emphasizes NATO report.

The Asia-Pacific region accounts for 42% of the world's natural disasters, and 65% of their victims. The UN Economic and Social Commission for Asia and the Pacific (ESCAP) indicated it will establish a regional platform for sharing information among disaster risk management authorities and produce an Asia-Pacific Disaster Report, which will synthesize information from member States, and provide assessment of the disaster risk reduction in the region and identify future priorities and trends.

The UN Human Settlements Programme (UN-HABITAT) launched the Cities and Climate Change Initiative to focus on mitigation and adaptation to climate change impacts on human settlements within the framework of urban governance, decentralization, strengthening local authorities, and environmental planning and management. ([more](#))

6.9.6 Post-Kyoto Negotiations

The results of the International Scientific Congress on Climate Change: Global Risks, Challenges & Decisions held in preparation for the December conference will be published in June 2009. There are concerns that the richness of new information might increase policy-makers' confusion about setting priorities and targets. Scientists tend to agree that the widely accepted 2°C (3.6°F) warming target might not be enough to prevent some of the worst impacts of climate change.

India announced that it intends to resist accepting legally binding greenhouse gases emissions cuts at the negotiations for the new post-Kyoto treaty. ([more](#))

Military Implications:

[Same as previous 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: (see a more expanded list in the [Appendix](#))

Severe global warming will render half of world's inhabited areas unlivable, expert warns
<http://www.guardian.co.uk/environment/2009/mar/12/global-warming-temp-rise-population>

Scientist: Warming Could Cut Population to 1 Billion

<http://dotearth.blogs.nytimes.com/2009/03/13/scientist-warming-could-cut-population-to-1-billion/>

Lower Increases In Global Temperatures Could Lead To Greater Impacts Than Previously Thought, Study Finds

<http://www.sciencedaily.com/releases/2009/02/090223221425.htm>

Global crisis 'to strike by 2030'

http://news.bbc.co.uk/2/hi/uk_news/7951838.stm

The Fifth World Water Forum

<http://www.worldwatercouncil.org/index.php?id=1842>

Ministerial Forum on Water of the Group of 77

<http://www.g77.org/water/>

Arctic meltdown is a threat to humanity

<http://www.newscientist.com/article/mg20127011.500-arctic-meltdown-is-a-threat-to-humanity.html?full=true>

A sinking feeling. Sea levels are rising twice as fast as had been thought

http://www.economist.com/science/displaystory.cfm?story_id=13277407

Changing climate increases West Nile threat in U.S.

<http://www.dailyclimate.org/tdc-newsroom/west-nile/Changing-climate-increases-West-Nile-threat-in-U.S>

Health hazards demand stronger climate change measures, argues UN agency

<http://www.un.org/apps/news/story.asp?NewsID=30155&Cr=climate+change&Cr1=health>

NEW HORIZONS. Finding a path away from NATO's de-solidarisation

<http://www.natonewhorizons.org/NewHorizons-DigitalEdition.pdf> (14 MB file)

Asia-Pacific Countries See the Need to Cooperate to Reduce Risk of Disasters

<http://www.unescap.org/unis/press/2009/mar/g24.asp>

"Climate Change: Global Risks, Challenges and Decisions", 10-12 March 2009, Copenhagen

<http://climatecongress.ku.dk/>

Climate scenarios 'being realised'. Tough climate signal to West

http://www.telegraphindia.com/1090301/jsp/nation/story_10608007.jsp

6.10 Nanotechnology Safety Issues

More detailed descriptions of the following nanotechnology issues are in the [Appendix](#)

- Evidence of Damage to Beneficial Microbes from Nanoparticles ([more](#))
- EU tightened safety precautions on nano-containing cosmetics to take effect in 2012 ([more](#))
- Australian unions and industry are increasing pressure for urgent regulation to protect workers from nanotechnology risks, and to follow international guidelines on company registering and labeling ([more](#))
- New study on the effects of nanoparticles on plants determined that nanoparticles above certain concentrations could clog the vascular systems of plants ([more](#))
- Compilation of research on public's perception of nanotechnology ([more](#))
- Review of analytical methods to assess nanoparticle toxicity ([more](#))
- European nanotech meetings to be held in June and September 2009 to address nanotechnology benefits and risks for European industry and society ([more](#))

Military Implications:

[Same as previous on this issue] Military personnel concerned with nanotech issues should contribute their views to these activities. Also, relevant military personnel should review the information generated by such activities to improve military and contractor practices, as well as to assist and cooperate with the organizations working on those issues for enriching their studies.

Sources:

Nanoparticles from sunscreens damage microbes

<http://www.environmentalhealthnews.org/ehs/news/nanoparticles-damage-microbes>

Cosmetics companies to face new rules in Europe

<http://www.iht.com/articles/ap/2009/03/24/business/EU-EU-Parliament-Cosmetics.php>

Calls to protect workers from nano risks

<http://www.abc.net.au/science/articles/2009/03/24/2524875.htm>

Starting to explore nanotechnology's impact on major food crops

<http://www.nanowerk.com/spotlight/spotid=9516.php>

Hearts and Minds and Nanotechnology

<http://www.merid.org/NDN/more.php?id=1757>

Analytical methods to assess nanoparticle toxicity

<http://www.rsc.org/Publishing/Journals/AN/article.asp?doi=b818082b>

EuroNanoForum 2009. Nanotechnology for Sustainable Economy

<http://www.euronanoforum2009.eu/>

Nanotech Europe 2009, Berlin, 28-30 September 2009

<http://www.nanotech.net/>

Item 7. Reports Suggested for Review**7.1 NATO Report on New Security Threats and Trends**

NATO's report "New Horizons," released ahead of the organization's 60th anniversary summit, addresses the challenges that the organization faces in view of the new threats and trends triggered by current geopolitical developments. Most of the threats and trends have an environment-related root, ranging from structural energy and resource problems that, "may lead to energy/raw material nationalism by anti-Western states," and resource conflicts, to the various direct and indirect consequences of climate change that will lead to "acceleration in the breakdown of ecosystems and more severe 'natural' disasters and food shortages, in turn leading to much higher levels of migration, increased human suffering and greater social unrest". The report quotes a NATO official: "*[Climate change] is a global problem requiring the involvement of the UN, NATO, EU and other regional organizations. NATO forces must develop the resiliency to adjust to changing climate and react to its consequences.*" However, the report emphasizes, "The only aspect of climate change that was considered to be truly affecting the Alliance was resource competition."

Military Implications:

The report is a comprehensive overview of security threats and challenges in general, providing some concrete recommendations helpful for improving military as well as non-military preparedness for addressing potential environmental security issues. (Note Item 4 above regarding a possible lithium cartel.)

Sources:

NEW HORIZONS. Finding a path away from NATO's de-solidarisation
<http://www.natonewhorizons.org/NewHorizons-DigitalEdition.pdf> (14 MB file)

7.2 U.K.'s Military Technology Plan Includes Alternative Energy

The Defence Technology Plan of the British Ministry of Defence outlines the British military's long-term research objectives to help defence contractors set R&D priorities. It highlights five "capability visions," including reducing dependency on fossil fuels by introducing new alternatives.

Military Implications:

Military efforts on alternative energy R&D might consult The Defence Technology Plan for potential collaboration with the UK on such R&D and relevance of the Army Strategy for the Environment to issues and opportunities raised.

Sources:

MOD unveils future UK defence tech research plan
<http://www.mod.uk/DefenceInternet/DefenceNews/EquipmentAndLogistics/ModUnveilsFutureUkDefenceTechResearchPlan.htm>
Defence Technology Plan
<http://www.science.mod.uk/Strategy/dtplan/default.aspx>

7.3 Addressing Potential Business-related Water Scarcity Issues

Water Scarcity & Climate Change: Growing Risks for Businesses & Investors report by the Pacific Institute at the request of Ceres (national network of investors, environmental organizations and other public interest groups working with companies and investors to address sustainability challenges such as global climate change) addresses the impact of climate change and business practices on water and the potential consequences of water scarcity to businesses. The report also explores the role of investment strategies to mitigate harmful impacts. Using information from over 100 companies, the report identifies water-related risks specific to eight key sectors such as energy, mining, and computer technology, and offers a framework to calculate and address industries' "water footprints".

Military Implications:

The report is an additional source of information on different industries' water footprints, and their potential future consequences both for supply and for addressing water stress issues.

Sources:

Water Scarcity & climate change: Growing Risks for Businesses & Investors
http://www.pacinst.org/reports/business_water_climate/full_report.pdf
Impending water shortages spell unforeseen financial losses
<http://pubs.acs.org/action/showStoryContent?doi=10.1021/on.2009.03.24.302968&cookieSet=1>

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

Item 1. Climate Change Triggers Redrawing Swiss-Italian Borders

Sources: (a more expanded list)

Melting snow prompts border change between Switzerland and Italy

<http://www.independent.co.uk/news/world/europe/melting-snow-prompts-border-change-between-switzerland-and-italy-1653181.html>

Climate changes Europe's borders – and the world's

<http://www.newscientist.com/article/dn16854-climate-changes-europes-borders--and-the-worlds.html>

Additional sources in the Appendix

Melting glaciers force Italy, Swiss to redraw border

<http://www.franconarducci.com/Archivio/tabid/67/articleType/ArticleView/articleId/312/Default.aspx>

Climate, the glaciers are changing the borders with Switzerland

<http://translate.google.com/translate?hl=en&u=http%3A%2F%2Fwww.franconarducci.com%2FArchivio%2Ftabid%2F67%2FarticleType%2FArticleView%2FarticleId%2F307%2FDefault.aspx> (English translation)

Item 2. Water-related Rights and Security Addressed by 5th World Water Forum

The 5th World Water Forum was held in Istanbul, March 16-22, 2009, under the framework “bridging divides for water.” Several theme and regional sessions addressed water resources, security implications and risk management in the context of global change—mainly the effects of climate change and the economic crises. There was consensus that the main drivers of the increasing global demand for water are population growth, mobility, changing living standards, and growing energy demand that might increase hydropower and biofuels production. Some suggestions made at the Forum include: constitution of a “World Water Parliament” (proposed by a Brazilian official); stricter zoning laws; linking water and energy efficiency initiatives; reiteration of need for effective early warning systems and focus on adaptation strategies and developing bottom-up approaches as part of a proactive (rather than reactive) policy processes for addressing disasters and reducing water-related conflicts; financing for improving access to water (it was said that \$1 invested in water and sanitation saves \$4-\$12 in health and social costs); including water issues in the governing principles to avoid water-related conflict; and the need to respect international law protecting water resources during conflict.

The global water policy debate was around the implications of designating access to clean water as a fundamental human right. The Ministerial Declaration adopted by the Forum includes commitments to recognize water as a basic human need, but there was large support for the human right status and some participants suggested that the issue be further discussed under the auspices of the UN to produce binding rules on the right to water and sanitation. The statement delivered by Maude Barlow, Senior Advisor on Water to the UN General Assembly President Miguel d’Escoto stipulated that “Water is a public trust, a common heritage of people and nature,

and a fundamental human right,” and suggested that since, “the present World Water Forum does not share the widely held views against water privatization and on preventing water from becoming a commodity ... future Forums should adopt international norms and conduct their deliberations under the auspices of the United Nations. I urge UN Member States to work together to promote policies for a Forum that meets our well-developed methodologies for such events. These policies should be implemented before the meeting of the Sixth World Water Forum.”

Other reports launched at the Forum include the 3rd World Water Development Report (WWDR-3), “Water in a Changing World,” and “Managing Water for All: An OECD Perspective on Pricing and Financing by OECD.”

Sources: (a more expanded list)

5th World Water Forum

<http://worldwaterforum5.org/>

Managing Water for All: An OECD Perspective on Pricing and Financing

http://www.oecd.org/document/16/0,3343,en_2649_34311_42289488_1_1_1_1,00.html

To the Fifth World Water Forum Delivered by Maude Barlow, Senior Advisor on Water to the President

<http://www.un.org/ga/president/63/statements/water190309.shtml>

The 3rd United Nations World Water Development Report: Water in a Changing World

<http://www.unesco.org/water/wwap/wwdr/wwdr3/>

NEW HORIZONS. Finding a path away from NATO’s de-solidarisation

<http://www.natonewhorizons.org/NewHorizons-DigitalEdition.pdf> (14 MB file)

World Water Forum Bulletin. Summary of the 5th World Water Forum.

<http://www.iisd.ca/ywb/water/worldwater5/html/ywbvol82num23e.html#REPORT>

Managing Water for All: An OECD Perspective on Pricing and Financing

http://www.oecd.org/document/16/0,3343,en_2649_34311_42289488_1_1_1_1,00.html

Is access to clean water a basic human right?

<http://www.csmonitor.com/2009/0319/p06s01-woeu.html>

World Bank appeals for water investment

<http://www.google.com/hostednews/ap/article/ALeqM5igEAd0RMIRim96Ta9PB5qC46EdjgD96VR5IO0>

World's water supplies at risk, UN says

<http://forster.yourguide.com.au/news/world/world/general/worlds-water-supplies-at-risk-un-says/1457559.aspx?storypage=0>

World Water Day 2009 on Sharing Transboundary Water Resources

<http://www.ehs.unu.edu/article:692>

World Water Day 2009

<http://www.unwater.org/worldwaterday/flashindex.html>

Ballooning global population adding to water crisis, warns new UN report

<http://www.un.org/apps/news/story.asp?NewsID=30167&Cr=water&Cr1=supply>

The 3rd United Nations World Water Development Report: Water in a Changing World

<http://www.unesco.org/water/wwap/wwdr/wwdr3/>

Green Cross International

www.greencrossinternational.net/water and

www.greencrossinternational.net/convention

World Water Forum opening ceremony

<http://www.ens-newswire.com/ens/mar2009/2009-03-16-01.asp>

Forum Moves Water Higher Up Global Priority List

<http://www.ens-newswire.com/ens/mar2009/2009-03-18-01.asp>

Access to Water: A Human Right or a Human Need?

<http://www.ens-newswire.com/ens/mar2009/2009-03-27-03.asp>

Sin aqua non. Dams are making a comeback

http://www.economist.com/research/articlesBySubject/displayStory.cfm?story_id=13349220&subjectID=348924&fsrc=nwl

Item 4. Future Lithium Dependency Raises New Energy Security Concerns

Sources: (a more expanded list)

Bolivia pins hopes on lithium, electric vehicles

<http://www.physorg.com/news155115838.html>

Mineral wealth, political weapon. Morales wields control of nation's lithium, uranium as cudgel

<http://www.washingtontimes.com/news/2009/feb/10/mineral-wealth-political-weapon/>

In Bolivia, Untapped Bounty Meets Nationalism

http://www.nytimes.com/2009/02/03/world/americas/03lithium.html?_r=1

Bolivians set to vote on new constitution

<http://www.csmonitor.com/2009/0123/p06s01-woam.html>

Lithium Supply May Not Be Sufficient for Battery Production

<http://flashlightnews.org/story582.shtml>

Got lithium? Lots

<http://www.autobloggreen.com/2009/01/28/got-lithium-lots/>

Lux Alternative Power and Energy Storage Intelligence

<http://www.luxresearchinc.com/info/power>

Peak Lithium: Will Supply Fears Drive Alternative Batteries?

<http://blogs.wsj.com/environmentalcapital/2009/02/03/peak-lithium-will-supply-fears-drive-alternative-batteries/>

NEW HORIZONS. Finding a path away from NATO's de-solidarisation

<http://www.natonewhorizons.org/NewHorizons-DigitalEdition.pdf>

Item 6. Updates on Previously Identified Issues

6.1 United States Bans Cluster Munitions Export

Sources: (a more expanded list)

Cluster Munition Coalition welcomes U.S. Cluster Bomb Export Ban

<http://www.stopclustermunitions.org/news/?id=1393>

US: Cluster Bomb Exports Banned

<http://www.hrw.org/en/news/2009/03/12/us-cluster-bomb-exports-banned>

States must take action to ensure elimination of cluster munitions, says Migiro

<http://www.un.org/apps/news/story.asp?NewsID=30230&Cr=disarmament&Cr1=>

Deputy secretary-general's message to a Special Event on the Convention on Cluster Munitions
<http://www.un.org/apps/dsg/dsgstats.asp?nid=160>

6.2 Russian Security Unit and Draft Law for Reinforcing Arctic Claims

Sources: (a more expanded list)

Russia plans Arctic security unit

http://www.marketwatch.com/news/story/russia-plans-arctic-security-unit/story.aspx?guid={66566728-4484-46AD-BB8C-6EC140149C97}&dist=msr_1

Russia says won't stand still in race for Arctic

<http://www.reuters.com/article/environmentNews/idUSTRE52P5NS20090326?pageNumber=1&virtualBrandChannel=0>

Canada won't be 'bullied' by Russia's plans to protect Arctic interests: Cannon

<http://www.google.com/hostednews/canadianpress/article/ALeqM5irfclyLncwNnVS84Bw9CxVv7mQ>

Global warming sparks new ice-cold war: Russia plans elite army unit in race for Arctic resources

<http://www.dailymail.co.uk/news/worldnews/article-1165318/Global-warming-sparks-new-ice-cold-war-Russia-plans-elite-army-unit-race-Arctic-resources.html>

NEW HORIZONS. Finding a path away from NATO's de-solidarisation

<http://www.natonewhorizons.org/NewHorizons-DigitalEdition.pdf> (14 MB file)

6.6 Global Fuel Economy Initiative Aims to Increase Cars' Fuel Efficiency 50% by 2050

Sources: (a more expanded list)

'50 by 50' Global Fuel Economy Initiative

http://www.fiafoundation.org/50by50/Documents/50BY50_report.pdf

International Agencies Launch 50% Global Fuel Economy Plan to Key Industry Players at Geneva Motor Show

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=562&ArticleID=6097&l=en>

UN-backed roadmap for halving auto emissions unveiled in Geneva

<http://www.un.org/apps/news/story.asp?NewsID=30083&Cr=greenhouse&Cr1>

Halve emissions from cars by 2050, auto industry told

<http://www.guardian.co.uk/environment/2009/mar/04/auto-industry-emissions>

6.9 Climate Change

6.9.1 Scientific Evidences and Natural Disasters

“Worst case” scenarios are already becoming reality and an increase in average temperatures of 6°C (10.8°F) by the end of the century is not ruled out, cautioned over 2,500 leading environmental experts attending a climate summit held in Copenhagen ahead of the December post-Kyoto negotiations. They issued a statement warning that unless swift political action, “dangerous climate change,” was imminent. Steven Sherwood, climate expert at Yale University, noted that due to the physiological limits of the human body, temperature rise by 7°C (12.6°F) over pre-industrial levels would render many parts of the globe uninhabitable, while 10°C (18°F) would encompass the bulk of today’s population. Along the same lines, Hans Joachim

Schellnhuber, director of the Potsdam Institute for Climate Impact Research in Germany, said that 5°C (9°F) global warming over present values would reduce human population to 1 billion.

Global warming might be further exacerbated by CO₂ released from the Antarctic Ocean because of shifting wind patterns due to orbital shift, found a team of scientists at Columbia University's Lamont-Doherty Earth Observatory.

"Assessing Dangerous Climate Change Through an Update of the IPCC 'Reasons for Concern'", a study published in the Proceedings of the National Academy of Sciences, updates some of the findings of the IPCC's 2001 Third Assessment Report. It found that even a lower level of increase in average global temperatures could have serious consequences in all five domains of concern analyzed: 1) risk to threatened ecosystems; 2) risk of extreme weather events; 3) vulnerability disparities; 4) damage assessment; and 5) risks of large-scale discontinuities due to phenomena with very large impacts (e.g. melting of major ice sheets.)

6.9.2 Food and Water Security

"Water in a Changing World," the 3rd World Water Development Report, notes that by 2050 population would reach 9.1 billion if fertility rate continues to decrease, while if it would stay at the present level of 2.56, the population would reach 11 billion, consequently increasing demand for food and water in both cases. Over the last 50 years, freshwater withdrawals have tripled and irrigation doubled due to population growth. The report also made the link between poverty and water resources, noting that "The number of people living on less than \$1.25 a day coincides approximately with the number of those without access to safe drinking water."

Population growth to 8.3 billion by 2030 will increase food and energy demand by 50% and fresh water by 30%, said John Beddington, chair of a new UK Cabinet Office task force set up to address food security, at the Sustainable Development UK 09 conference. Underlining a belief that climate change will be an exacerbating factor, he suggested swift policy measures to improve agriculture and consumption practices. For addressing the situation at the European level, he proposed the creation of a position of chief science adviser to the European Commission.

A new report by the Institute for Agriculture and Trade Policy (IATP), calls for a global shift from the industrial model of agriculture toward sustainable practices. The recommendations include an international rights-based approach that ensures water availability for ecosystems and people and harmonization of policy approaches to water, agriculture and climate.

At the annual UNIS-UN conference on "The Food Crisis: A Global Challenge", held March 5-6, 2009, UN Secretary-General Ban Ki-moon discussed the linkages between food security and climate change and stated that helping communities around the world adapt to climate change will be a key issue at the UN Climate Change Conference in December 2009.

The Water and Disaster Action Plan, prepared under the auspices of the Secretary-General's Advisory Board on Water and Sanitation, provides a tool for the UN System to mobilize and coordinate its efforts in assisting member States to face the challenge of natural disasters. It was launched at the fifth World Water Forum, held in Istanbul, Turkey, March 16-22, 2009

The First Ministerial Forum on Water of the Group of 77, held February 23-25, in Muscat, Oman, concluded with the adoption of the Muscat Declaration on Water, which suggests the recognition of human right to clean water and sanitation as a key goal. Ministers in charge of water recommended the promotion of innovative technologies among developing countries to address the negative impacts of water-related disasters.

On World Water Day, the Executive Secretary of the UN Convention to Combat Desertification (UNCCD), Luc Gnacadja, called for prudent water management to halt land degradation and its consequences, including conflict over scarce resources.

“The Roadmap to End Hunger” report prepared by more than 30 organizations, calls for the US to boost spending on food and agricultural aid by 60% in 2010 to \$6.36 billion, and commit to further increases to \$13.31 billion by 2014. Other recommendations include: a strengthened emergency response to better address short-term hunger needs; more flexible safety nets to mitigate the impacts of shocks on vulnerable populations; improved nutrition programs to ensure that people in the developing world have access to the nourishment needed to lead healthy lives; and expanded programs to enhance the productivity of smallholder farmers, which is critical in addressing chronic hunger. New bipartisan legislation expected to be unveiled in the coming weeks incorporates key recommendations of the Roadmap.

Gender inequality has amplified the impact of the financial, food and climate crises on African women, said Isatou Njie-Saidy, Vice-President of Gambia, at the 53rd session of the Commission on the Status of Women, held on March 4. The panel organized by The UN Economic Commission for Africa (UNECA) and the UN Development Fund for Women (UNIFEM) called on the international community to promote gender-specific plans and programs to help women better address these crises.

6.9.3 Melting Glaciers and Sea Ice

New evidence shows that the Arctic is warming faster than any other place on Earth. Over the past three decades, the average warming over the Arctic Ocean was 3°C, even reaching 5°C (9°F) in some parts where the ice has been lost, while the average global temperature has risen by less than 1°C (1.8°F). The lakes in Siberia are now five times larger than in 2006, notes Katey Walter, ecologist at the University of Alaska in Fairbanks. She underlines some potential consequences, such as increasing permafrost melting and runaway warming, the growing amount of fresh water flowing into the Arctic Ocean from the melting sea ice, glaciers, and rivers, changing the ocean conveyor current, with consequences on the Asian monsoon and rain patterns affecting food and water supply of a large part of world population.

Considering the rapidly melting ice sheets in Greenland and Antarctica, sea levels might be rising by 1 meter or more by 2100, twice as fast as forecast by the IPCC, said scientists at the Copenhagen environmental conference.

6.9.4 Health

Changes in rainfall patterns and rapid urbanization increase dengue fever outbreaks in Asian countries such as Indonesia, said an official of the World Health Organization Southeast Asia.

A study published in the journal *Environmental Health Perspectives* notes that higher temperatures, humidity and rainfall associated with climate change have led to increased outbreaks of West Nile Virus infections across the United States in recent years. The authors warn that the pattern will only get worse in coming decades with increased economic and health burdens.

At the international scientific congress “Climate Change: Global Risks, Challenges and Decisions,” from 10-12 March 2009, in Copenhagen, Denmark, WHO noted the uneven distribution of health impacts of climate change globally, identifying populations in small island developing States, mountainous regions, large urban areas, coastal areas, and areas that lack access to water among the most vulnerable. WHO estimates that around 150,000 deaths (85% of

them young children) occur in low-income countries each year due to malnutrition, diarrhea, malaria, and flooding as effects of climate change alone.

On World Water Day, March 22nd, UNEP highlighted the potential benefits of investing in the world's freshwaters, including the potential benefits to the global economic recovery and to accelerating a response to climate change. According to UNEP, the market for supply, sanitation, and water efficiency is expected to be nearly US\$660 billion by 2020, and that global economic benefits of US\$38 billion annually could be reaped from investing US\$15 billion annually in halving by 2015 the number of people without sustainable access to safe water and basic sanitation.

6.9.5 Adaptation

NATO's "New Horizons" report emphasizes that energy and environmental standards should be considered in security-related reconstruction and stabilization activities (e.g., levees, earthquake-proof housing, improved agricultural practices, and alternative energy systems), as well as better information sharing to assess future needs of individual communities/countries.

The first-ever meeting of the Committee on Disaster Risk Reduction of the UN Economic and Social Commission for Asia and the Pacific (ESCAP) was held March 25-27, 2009, gathering more than 200 delegates including ministers and senior officials from 25 countries of the most disaster-prone region, to discuss the creation of Disaster Risk Reduction strategies. The Asia-Pacific region accounts for 42% of the world's natural disasters, and 65% of their victims. Noeleen Heyzer, UN Under-Secretary-General and ESCAP Executive Secretary, announced that ESCAP would establish a regional platform for sharing information among disaster risk management authorities. ESCAP will also produce the Asia-Pacific Disaster Report, which will synthesize information from member States, provide assessment of the disaster risk reduction in the region and identify future priorities and trends.

The UN Human Settlements Programme (UN-HABITAT) launched the Cities and Climate Change Initiative (CCCI) at a conference titled "Cities and Climate Change," on March 17 in Oslo, Norway. The initiative focuses on mitigation and adaptation to climate change impacts on human settlements within the framework of urban governance, decentralization, strengthening local authorities, and environmental planning and management. The conference also marked the launch of pilot projects to help Maputo in Mozambique, Kampala in Uganda, Sorsogon City in the Philippines, and Esmeraldas in Ecuador to adapt to climate change by redesigning infrastructure. The results of the deliberations will be forwarded to the Copenhagen climate change conference in December 2009.

6.9.6 Post-Kyoto Negotiations

An International Scientific Congress on Climate Change: Global Risks, Challenges & Decisions was held in preparation for the December conference. The outcomes will be published in a full synthesis report June 2009. However, there are concerns that the richness of new information might increase policy-makers' confusion about setting priorities and targets. Scientists tend to agree that the widely accepted 2°C (3.6°F) warming target might not be enough to prevent some of the worst impacts of climate change.

India announced that it intends to resist accepting legally binding greenhouse gases emissions cuts at the negotiations for the new post-Kyoto treaty

Sources: (an expanded list)

Planet faces 'dangerous climate change'

<http://www.watoday.com.au/world/planet-faces-dangerous-climate-change-20090314-8ydi.html?page=-1>

Severe global warming will render half of world's inhabited areas unlivable, expert warns

<http://www.guardian.co.uk/environment/2009/mar/12/global-warming-temp-rise-population>

Scientist: Warming Could Cut Population to 1 Billion

<http://dotearth.blogs.nytimes.com/2009/03/13/scientist-warming-could-cut-population-to-1-billion/>

Wind pattern change may intensify global warming

http://www.thaindian.com/newsportal/sci-tech/wind-pattern-change-may-intensify-global-warming_100166453.html

Scientists are grim, economists more optimistic about climate change's effects

<http://www.nytimes.com/cwire/2009/03/13/13climatewire-scientists-see-more-grim-effects-of-climate--10121.html>

Lower Increases In Global Temperatures Could Lead To Greater Impacts Than Previously Thought, Study Finds

<http://www.sciencedaily.com/releases/2009/02/090223221425.htm>

Global crisis 'to strike by 2030'

http://news.bbc.co.uk/2/hi/uk_news/7951838.stm

The Fifth World Water Forum:

<http://www.worldwatercouncil.org/index.php?id=1842>

Statements by Under-Secretary-General Mr. Sha Zukang

<http://www.un.org/esa/desa/ousg/>

Ministerial Forum on Water of the Group of 77

<http://www.g77.org/water/>

The Muscat Declaration

http://www.g77.org/water/Muscat_Declaration_on_Water.pdf

Message from Mr. Luc Gnacadja, Executive Secretary of the United Nations Convention to Combat Desertification (UNCCD) on the Occasion of the 17th World Water Day, 22 March 2009

http://www.unccd.int/publicinfo/docs/Message_World_Water_Day_22_March_2009.pdf

Integrated Solutions to the Water, Agriculture and the Climate Crises

<http://www.tradeobservatory.org/library.cfm?refid=105477>

Secretary-General's remarks to the UNIS/UN Conference "Food Crisis : A Global Challenge"

<http://www.un.org/apps/sg/sgstats.asp?nid=3732>

UNIS-UN. The Food Crises: A Global Challenge

<http://www.unis-un.org/unisun/>

Press Release:

<http://www.prnewswire.com/mnr/friendsofwfp/37189/>

The Roadmap to End Hunger:

<http://www.prnewswire.com/mnr/friendsofwfp/37189/docs/37189-Brochure22009.pdf>

Press conference by high-level African women officials on addressing economic, food, climate change crises

http://www.un.org/News/briefings/docs/2009/090304_Women.doc.htm

Arctic meltdown is a threat to humanity

<http://www.newscientist.com/article/mg20127011.500-arctic-meltdown-is-a-threat-to-humanity.html?full=true>

A sinking feeling. Sea levels are rising twice as fast as had been thought

http://www.economist.com/science/displaystory.cfm?story_id=13277407

Sea levels rising twice as fast as predicted

<http://www.independent.co.uk/environment/climate-change/sea-levels-rising-twice-as-fast-as-predicted-1642087.html>

Scientists to issue stark warning over dramatic new sea level figures

<http://www.guardian.co.uk/science/2009/mar/08/climate-change-flooding>

INTERVIEW-Changing climate boosts dengue cases -WHO official

<http://www.reuters.com/article/latestCrisis/idUSSP402739>

Changing climate increases West Nile threat in U.S.

<http://www.dailyclimate.org/tdc-newsroom/west-nile/Changing-climate-increases-West-Nile-threat-in-U.S>

Health sector will bear brunt of global crises, says top UN health official

<http://www.un.org/apps/news/story.asp?NewsID=30248&Cr=health&Cr1=financial+crisis>

World Water Day 2009

<http://www.unwater.org/worldwaterday/flashindex.html>

World Water Day Message from Achim Steiner

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=573&ArticleID=6106&l=en&t=long>

Health hazards demand stronger climate change measures, argues UN agency

<http://www.un.org/apps/news/story.asp?NewsID=30155&Cr=climate+change&Cr1=health>

NEW HORIZONS. Finding a path away from NATO's de-solidarisation (14 MB file)

<http://www.natonewhorizons.org/NewHorizons-DigitalEdition.pdf>

Asia-Pacific nations to boost efforts to curb disaster risk – UN

<http://www.un.org/apps/news/story.asp?NewsID=30314&Cr=Disaster&Cr1>

Asia-Pacific Countries See the Need to Cooperate to Reduce Risk of Disasters

<http://www.unescap.org/unis/press/2009/mar/g24.asp>

Oslo to host cities climate change conference (UN HABITAT Press Release)

<http://www.unhabitat.org/content.asp?cid=6352&catid=5&typeid=6&subMenuId=0>

"Climate Change: Global Risks, Challenges and Decisions", 10-12 March 2009, Copenhagen

<http://climatecongress.ku.dk/>

Climate scenarios 'being realised'

<http://news.bbc.co.uk/2/hi/science/nature/7940532.stm>

Did climate conference just confuse the politicians?

<http://www.newscientist.com/article/mg20127004.200-did-climate-conference-just-confuse-the-politicians.html>

Tough climate signal to West

http://www.telegraphindia.com/1090301/jsp/nation/story_10608007.jsp

6.10 Nanotechnology Safety Issues

6.10.1 Evidence of Damage to Beneficial Microbes from Nanoparticles

Papers presented at the annual conference of the American Chemical Society by scientists from the Univ. of Toledo, the Univ. of Utah, and Utah State Univ. indicated that titanium dioxide, copper oxide, zinc oxide, and silver nanoparticles, all used in consumer products and likely to turn up subsequently in the environment, may damage environmental microbes that perform vital functions, such as removing pollutants from water and may also pose a hazard to aquatic life.

Military Implications:

Military personnel conducting nanotech risk assessments should review these results and consider them in carrying out their work.

Source:

Nanoparticles from sunscreens damage microbes

<http://www.environmentalhealthnews.org/ehs/news/nanoparticles-damage-microbes>

6.10.2 EU Tightens Safety Precautions on Nano-containing Cosmetics

The European Parliament has tightened up safety requirements on cosmetics to require additional checks on those containing nanomaterials; the new rules take effect in 2012.

Military Implications:

Although cosmetics are of only peripheral concern to the military, these new regulations undoubtedly portend further restrictions on other classes of products containing nanomaterials. The military should be sure that it is prepared to deal with future legislation and regulation in the U.S. and abroad.

Source:

Cosmetics companies to face new rules in Europe

<http://www.iht.com/articles/ap/2009/03/24/business/EU-EU-Parliament-Cosmetics.php>

6.10.3 Pressure Increases in Australia for Nanotech Safety Regime

After a recent panel discussion on nanotechnology and occupational health and safety held at Parliament House in Canberra, Australian unions and industry are calling for urgent regulation to protect workers from nanotechnology risks in the face of a dearth of hard data, making for difficult decisions on the nature and timing of new safety requirements. According to an ABC report, Brian Power of the Australian Nano Business Forum believes 98% of nanotechnology is safe, but agrees workers should be protected from any risks. He also emphasizes Australia will ultimately have to follow international guidelines on a company register and labeling.

Military Implications:

Australia is only the latest instance of this movement; the military should prepare itself for increased nanotech regulation in countries around the world.

Source:

Calls to protect workers from nano risks

<http://www.abc.net.au/science/articles/2009/03/24/2524875.htm>

6.10.4 New Study of Nanomaterials and Plant Toxicity

According to an article and a technical review in nanowerk, Prof. Pu Kun Che and colleagues at Clemson Univ. have published one of the few papers so far on the effects of nanoparticles on plants, and the possible resulting hazards to both the plants and the associated food chain. They determined that nanoparticles above certain concentrations could clog the vascular systems of plants.

Military Implications:

The military should follow these and similar investigations to add this new aspect to nanotech risk assessment to their deliberations.

Sources:

Starting to explore nanotechnology's impact on major food crops

<http://www.nanowerk.com/spotlight/spotid=9516.php>

Nanoparticle uptake by plants

<http://www.nanowerk.com/spotlight/spotid=6331.php>

6.10.5 New Paper Reviews Aspects of Public Perception of Nanotech

According to an article in Meridian nanotechnology & development news, “This article compiles much of the research conducted over the last several years regarding what factors influence the public's perception of nanotechnology.”

Military Implications:

Military public communications personnel should review this paper for ideas on communicating with the public on military applications of nanotechnology.

Sources:

Hearts and Minds and Nanotechnology

<http://www.merid.org/NDN/more.php?id=1757>

Public perceptions of nanotechnology

www.nature.com/nnano/journal/v4/n3/full/nnano.2009.16.html (purchase or subscribe)

6.10.6 New Review of Analytical Methods to Assess Nanoparticle Toxicity

According to the abstract, “Nanotoxicology relies on many analytical methods for the characterization of nanomaterials as well as their impacts on in vitro and in vivo function. This review provides a critical overview of these techniques from the perspective of an analytical chemist, and is intended to be used as a reference for scientists interested in conducting nanotoxicological research as well as those interested in nanotoxicological assay development.”

Military Implications:

Relevant military personnel should evaluate the methods to determine their utility in assessment of potential toxicity, carcinogenicity or other effects related to nanotechnology.

Source:

Analytical methods to assess nanoparticle toxicity

<http://www.rsc.org/Publishing/Journals/AN/article.asp?doi=b818082b>

6.10.7 European Nanotech Meetings to Be Held in June and September 2009

EuroNanoForum 2009 will be held from 2 to 5 June 2009, at the Prague Congress Centre, under the auspices of the Czech government and with the support of the Industrial Technologies Programme of the European Commission. According to the announcement, it "...will address the contribution and challenges of nanotechnology research for a sustainable development of European industry and society, such as the need for reduction in carbon emissions and fossil fuels dependence, the substantial increase in energy demand, pollution control, clean water management and sustainable quality of life of the European citizen, as well as material production sustainability and efficiency."

Nanotech Europe 2009 will be held in Berlin 28-30 September 2009. Topics will include health and biology (e.g., improved sensors), and safety (toxicological studies of nanomaterials, risk management, and regulatory issues).

Military Implications:

Military personnel in the European theater concerned with nanotechnology should consider attending these meetings, to learn of current developments in European nanotech and policy and to report back to relevant personnel in the U. S.

Source:

EuroNanoForum 2009. Nanotechnology for Sustainable Economy

European and International Forum on Nanotechnology, 2-5 June, 2009, Prague, Czech Republic
<http://www.euronanoforum2009.eu/>

Nanotech Europe 2009, Berlin, 28-30 September 2009

<http://www.nanotech.net/>