

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY
Contract No: DAAD19-02-D-0001/ Delivery Order 0456 with Battelle Columbus Operations for the U.S. Army
Environmental Policy Institute

JUNE 2007 REPORT

Note to Readers: Pages 1-12 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 13.

Item 1. UN Nuclear Terrorism Convention Enters into Force on July 7, 2007.....	1
Item 2. UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions.....	1
Item 3. UNEP Warns No Peace in Sudan without Environmental Management Plan.....	2
Item 4. International Crisis Group to Debate Considering Climate Change Variable in Conflicts.....	2
Item 5. World Health Organization: Stress Environmental Impact on Human Health.....	3
Item 6. China's Climate Change and S&T Action Plan.....	3
Item 7. Technological Breakthroughs with Environmental Security Implications.....	4
7.1 Nanofibrils Film Improves Explosives Sensing Performance.....	4
7.2 Bacterial Proteins Help Nanoparticle Cleanup.....	4
7.3 New Material Has High Absorbency for Organic Solvents.....	5
Item 8. Updates on Previously Identified Issues.....	5
8.1 REACH Entered into Force on June 1, 2007.....	5
8.2 Organization for Security and Cooperation in Europe (OSCE) Moving Closer to Adopting an Environmental Security Strategy.....	5
8.3 Japanese Chemical Weapons Cleaning in China Yet to be Completed.....	6
8.4 Commercial Whaling Ban Strengthened by International Whaling Commission (IWC).....	6
8.5 Climate Change—Research Aspects.....	7
8.5.1 New Scientific Evidence.....	7
8.5.2 Mitigation of Climate Change.....	8
8.5.3 Post-Kyoto Negotiations.....	8
8.6 The Disputes over the Northern Territories Set to Continue.....	9
8.7 Idle Nighttime Computers Cited as Energy Wasters.....	10
8.8 Nanotechnology Safety Issues.....	10
8.8.1 French Group to Study Nanotech Environmental Health and Safety.....	10
8.8.2 New Nano Risk Framework.....	10
Item 9. Reports Suggested for Review.....	11
9.1 Worldwatch Institute: Assessing the Relation between Disasters and Conflict.....	11
9.2 SIPRI Year Book 2007 Points out Environmental, Nuclear, and Energy Threats.....	11
9.3 Cleantech Report™ by Lux Research.....	12
9.4 Environmental Change and Security Annual Report.....	12
Appendix.....	13

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE JUN 2007		2. REPORT TYPE		3. DATES COVERED 00-00-2007 to 00-00-2007	
4. TITLE AND SUBTITLE Worldwide Emerging Environmental Issues Affecting the U.S. Military. June 2007				5a. CONTRACT NUMBER	
				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 Same as Report (SAR)	18. NUMBER OF PAGES 25	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Item 1. UN Nuclear Terrorism Convention Enters into Force on July 7, 2007

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

Military Implications:

Although the U.S. is not yet Party to the Convention, the military should seek to enhance its international anti-nuclear terrorism collaboration within the framework of the Convention where possible. Environmental relatedness of this Convention derives from the extreme devastation possible from cheap, low-level radiation weapons within the budgets of terrorists.

Source:

International Convention for the Suppression of Acts of Nuclear Terrorism

<http://untreaty.un.org/ENGLISH/bible/englishinternetbible/partI/chapterXVIII/treaty19.asp>

Ban Ki-moon welcomes new agreement to defeat nuclear terrorism

<http://www.un.org/apps/news/story.asp?NewsID=22892&Cr=nuclear&Cr1=>

Item 2. UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions

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

Military Implications:

Military peacekeeping liaisons should be made aware of experts on relevant natural resources and environmental issues who might be available to aid future peacekeeping missions. Such experts and peacekeeping commanders should be queried to see if there are any special needs for training and standards for such missions. It would be wise to apply similar approaches to pre-conflict situations, as conflict prevention tools.

Sources:

Security Council Underscores Need for Peacekeeping Mandates to Consider Helping States Prevent Illegal Exploitation of Natural Resources from Fuelling Conflict

<http://www.un.org/News/Press/docs//2007/sc9060.doc.htm>

Item 3. UNEP Warns No Peace in Sudan without Environmental Management Plan

The UNEP report *Sudan Post-Conflict Environmental Assessment* underscores that the conflict-torn region is unlikely to achieve a lasting peace unless it switches to sound natural resources management. Desertification and deforestation, spread of deserts southwards, increased pressure by unsustainable agriculture, and environmental degradation exacerbated by oil exploitation all contribute to increasing scarcity of resources, the main cause of the Sudan conflict. The report emphasizes that if these problems are not quickly and appropriately addressed the conflict might spread.

Military Implications:

Military planning for Sudan should include environmental planning and capacity-building experts in operations.

Sources:

Darfur conflict heralds era of wars triggered by climate change, UN report warns

<http://environment.guardian.co.uk/climatechange/story/0,,2109490,00.html>

Environmental Degradation Triggering Tensions and Conflict in Sudan

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=512&ArticleID=5621&l=en>

Item 4. International Crisis Group to Debate Considering Climate Change Variable in Conflicts

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

Military Implications:

Conclusions from this assessment should be reviewed by relevant military personnel with environmental security-related responsibilities.

Sources:

Rainfall records could warn of war

<http://environment.newscientist.com/channel/earth/mg19426064.500?DCMP=NLC-nletter&nsref=mg19426064.500> (by subscription; full text in the [Appendix](#))

Item 5. World Health Organization: Stress Environmental Impact on Human Health

The World Health Organization published a report showing correlation between disease and environmental factors for the first time at country levels. The analysis reveals that reducing environmental risks including pollution, unsafe water, ultraviolet radiation, and climate change could save 13 million lives per year. WHO estimates that in some countries, more than one third of

the disease burden could be prevented through environmental improvements. Each country profile provide an overview of the health risks caused by the specific environmental situation of the country, thus helping policy making in setting priorities for disease prevention.

Military Implications:

Military health and planning personnel should consider their Area of Responsibility countries' health profiles as a tool for improving living and health standards of the local population and estimating social instability, as well as for protecting U.S. troops from risks. Although it is not likely that the WHO research would trigger any legally binding regulations, the use of these countries' profiles might generate national and regional environmental health policies.

Sources:

New country-by-country data show in detail the impact of environmental factors on health
<http://www.who.int/mediacentre/news/releases/2007/pr30/en/index.html>

Item 6. China's Climate Change and S&T Action Plan

China launched its first national climate change program in June 2007. Although it does not include mandatory caps on emissions, it shows a strong commitment to reducing greenhouse gas emissions. The program highlights some major targets and actions to achieve them by 2010: reducing energy consumption by about 20% per GDP unit; increasing the share of renewable energy to 10% of the primary energy supply; keeping emissions of nitrous oxide from industrial processes at 2005 levels; increasing reforestation by 20%, and increasing international cooperation. The program notes that "China's energy efficiency is about 10% lower than that of the developed countries, and its per unit energy consumption of energy-intensive products is about 40% higher than the advanced international level. Science and technology are the ultimate resort for humankind to tackle climate change." In view of this, the Chinese Ministry of Science and Technology has released an action plan for the science and technology (S&T) aspects of China's new climate change initiative.

Note: The Chinese State Environmental Protection Administration report released in June reveals a continuous deterioration of air and water quality in Chinese cities despite national efforts to reduce pollution levels. Concomitantly, preliminary estimates by the Netherlands Environmental Assessment Agency reveal that in 2006 China surpassed the U.S., becoming the world's largest CO₂ emitter.

Military Implications

This is another opportunity to explore ways of applying the Army's Strategy on the Environment internationally. Military representatives in China should contact their counterparts to exchange ideas on how the military cooperation can contribute in environmentally oriented science and technology activities.

Sources:

China's National Climate Change Programme
<http://en.ndrc.gov.cn/newsrelease/P020070604561191006823.pdf>

S&T to underpin China's climate activities

<http://www.scidev.net/News/index.cfm?fuseaction=readNews&itemid=3687&language=1>

China Struggling to Control Urban Pollution

http://english.sepa.gov.cn/zwxw/hjyw/200706/t20070612_105064.htm

China now no. 1 in CO2 emissions; USA in second position

<http://www.mnp.nl/en/dossiers/Climatechange/moreinfo/Chinanowno1inCO2emissionsUSAinsecondposition.html>

Item 7. Technological Breakthroughs with Environmental Security Implications

7.1 Nanofibrils Film Improves Explosives Sensing Performance

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

Military Implications

The military should follow up on this development for its possible application to environmental surveillance, range clearing, and battlefield cleanup.

Source:

U.S. and Chinese scientists have created a type of fluorescent sensing material that could lead to rapid detection of explosives in security screening

<http://www.physorg.com/news99672192.html>

7.2 Bacterial Proteins Help Nanoparticle Cleanup

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

Military Implications:

The military should follow this work in order to evaluate the possible use of this technology in environmental cleanup operations.

Source:

Microbes at work cleaning up the environment

http://www.llnl.gov/pao/news/news_releases/2007/NR-07-06-07.html

7.3 New Material Has High Absorbency for Organic Solvents

Researchers at Kyushu University in Fukuoka have developed a new material, which can absorb large amounts of organic solvents such as chloroform. The material can absorb 300-480 times its weight of various agents.

Military Implications:

The military should investigate this development for possible use in industrial and maintenance spill remediation and post-conflict cleanup.

Source:

Kyushu University developed new material, which can absorb large amount of organic solvent such as chloroform. Japan Chemical Information of May/2007 (text of the announcement in the [Appendix](#))

Item 8. Updates on Previously Identified Issues

8.1 REACH Entered into Force on June 1, 2007

The EU chemicals law, Registration, Evaluation, Authorization and Restrictions of Chemicals (REACH) entered into force on June 1. The law's managerial body, the European Chemicals Agency (ECHA) in Helsinki, officially began its operations. REACH is regulating the manufacturing, marketing, import, and use of all chemicals in the EU through a single system. The chemicals have to be registered over the next 11 years with the ECHA. REACH will significantly improve protection of human health and the environment while encouraging innovation and keeping the EU's chemical industry competitive. "[REACH] is the most progressive chemicals legislation in the world," said EU Environment Commissioner Stavros Dimas. [See also *International Controversies over REACH* in June 2006, *Integration of Chemical Regulations (REACH) Approved by European Council* in December 2005, and other related items in previous environmental security reports.]

Military Implications:

[Same as previous on this issue] The military should assess the REACH system's impacts on military operations in Europe in relation to existing SOFAs and other agreements, and intensify efforts to find safer alternatives to banned chemicals or those deemed to be of high concern for human health and the environment.

Sources:

New European Chemicals Agency starts operations as REACH enters into force
<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/745&format=HTML&aged=0&language=EN&guiLanguage=en>

8.2 Organization for Security and Cooperation in Europe (OSCE) Moving Closer to Adopting an Environmental Security Strategy

Further to last month's *OSCE to Develop an Environmental Security Strategy*, the Millennium Project learned that the Spanish OSCE chairmanship is working towards an environmental security strategy and is circulating a draft to be discussed and agreed upon by the ministers of the OSCE participating states at the Ministerial Meeting taking place in Madrid at the end of

November 2007. [See also *OSCE to Develop an Environmental Security Strategy* in May 2007 environmental security report.]

Military Implications:

[Similar to previous on the same issue] The militaries of OSCE countries are likely to be invited to comment on the draft strategy. This is an opportunity for the US Army's Strategy on the Environment to be used as a discussion document in this process. Russia and the CIS (Commonwealth of Independent States) were among the first to have a definition of environmental security; hence, military collaboration should be fruitful. If not already done, relevant military personnel should contact the Office of the Coordinator of OSCE Economic and Environmental Activities and the Environment and Security (ENVSEC) Initiative to collaborate on further development of the environmental security strategy and its implementation.

Source:

Millennium Project staff discussions with OSCE officials

8.3 Japanese Chemical Weapons Cleaning in China Yet to be Completed

June 2007 was the deadline agreed to by Chinese and Japanese authorities for cleaning up the Japanese chemical weapons littering China since the Japanese war against China. Yet, this month, a number of Chinese construction workers suffered health problems after being exposed to a ruptured mustard agent bomb believed to have been dropped by a Japanese warplane many years ago. The unexploded bomb was hit by the construction team while excavating for a residential building in Bayannaoer City in Inner Mongolia. The Japanese government is expected to receive a request to destroy the weapon, sources said. In May 2007, Japan's Supreme Court ruled that Chinese victims of Japanese biological warfare and other atrocities that occurred before and during World War II are not eligible for compensation. [See also *Discussions over World War II Japanese Warfare Program in China not Settled Yet* in July 2005, *China: Japan to Pay \$2.7 Million for War Gas Leak* in October 2003 and *Effects of Poison Gas Used in WWII by Japan* in May 2003 environmental scanning reports.]

Military Implications:

[Similar to previous on same issues] This is one more event that builds the case for an agreement for universal and ethical treatment of health damages induced by the use of chemical, biological or radiological weapons. The military should consider collaboration with diplomatic personnel on drafting provisions in anticipation of an agreement, and continue developing antidotes for such weapons.

Sources:

Japanese chemical bomb unearthed in north China

http://english.people.com.cn/200706/15/eng20070615_384705.html (article available for a limited time; full text in the [Appendix](#))

Japan rules against war claims

<http://www.guardian.co.uk/worldlatest/story/0,-6622616,00.html> (article available for a limited time on the website; full text in the [Appendix](#)).

8.4 Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)

Delegates to the IWC meeting adopted a resolution to keep the moratorium banning commercial whaling in effect, despite Japan's lobbying for its suspension. Conservation organizations and

anti-whaling countries argue that Japan's lethal "scientific research on whales," violates international regulations for whales' protection. Japan threatens to leave the IWC and form another organization to deal with regulations on whale-related issues. [See also *Marine Biodiversity Protection Regulations Need Improvement* in January 2006 and Website for *Marine Protected Areas and Cetaceans' Sanctuaries* in March 2007 environmental security reports.]

Military Implications:

The overwhelming vote in favor of the resolution to keep the ban reveals a clear trend towards strengthening marine conservation regulations' enforcement systems. However, precedents show that, in the case of whales, Japan repeatedly violated the moratorium. If so, then the military might at some point be asked to help in monitoring compliance.

Sources:

Commercial whaling ban strengthened at Anchorage whaling meeting

<http://www.greenpeace.org/international/news/commercial-whaling-ban-strengt>

Draft Resolution CITES, IWC/59/19 Agenda Item 14.3

<http://www.iwcoffice.org/documents/commission/IWC59docs/59-19.pdf>

8.5 Climate Change—Research Aspects**8.5.1 New Scientific Evidence**

The American National Academy of Sciences found that CO₂ emissions grew faster than forecasted by the International Panel on Climate Change (IPCC). Between 2000 and 2004, worldwide CO₂ emissions increased at 3.1% per year, three times the 1.1 % per year during the 1990s. The growth was predominantly driven by developing and least-developed economies, which accounted for 73% of global emissions growth in 2004.

NASA satellite observations revealed Greenland snow is melting faster than expected. In 2006, in some monitored areas there were 10 days more of melting snow than the average over the past 18 years. This is consistent with the pattern observed since 1988. "We need to do more. The situation is very dramatic," remarked European Commission President, José Manuel Barroso after visiting Greenland to personally observe the effects of global warming. The hunting and fishing season has shortened to four to five months compared to eight months a few years ago. The UN choice to celebrate World Environment Day 2007 in Tromsø, the Nordic Norway city, was to stress the global environmental impact of melting ice and snow and the role of satellite technology in identifying and analyzing long-term climatic trends and changes in polar regions.

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

8.5.2 Mitigation of Climate Change

"The world has moved from a global threat once called the Cold War, to what now should be considered the Warming War," Afelee Pita, Tuvalu Ambassador to the UN, told the Security Council in warning of the threat of rising sea levels to small island nations such as his country. The first session of the multi-stakeholder Global Platform for Disaster Risk Reduction was held in Geneva, June 5-7, 2007. Focusing on systematic implementation strategies of the "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters," the session highlighted the need for raising awareness and stimulating action at government and grassroots levels for improving disaster reduction preparedness in areas increasingly vulnerable to risk. The meeting's outcomes will be presented at the 62nd UN General Assembly. The next meeting of the Global Platform is planned for 2009.

Prior to the G8 Summit, representatives of 20 leading financial service companies—members of the UNEP Finance Initiative—called on G8 leaders to adopt deep emission reduction targets no later than 2009. They highlighted that in addition to climate-related disaster consequences for human security, inaction could lead to annual economic losses of as much as \$1 trillion by 2040. However, the economic aspect is just a small part of the post-disaster suffering, highlights the Worldwatch Institute report, *Beyond Disasters: Creating Opportunities for Peace*. The report notes that over the past decade, there were an average of 348 disasters per year—nearly one per day—with 1 billion people affected by floods alone. In 2006, human deaths from natural disasters were up 24% and 87 countries were affected by floods, which were responsible for most weather-related disasters. Sophisticated Japanese and Taiwan computer models show that tropical storms—typhoons—in the highly populated areas of the northwest Pacific will be getting worse for the next 100 years.

The UN University report *Re-thinking Policies to Cope with Desertification* warns that desertification reached global environmental crisis proportions and is representing "imminent threats to international stability." Unless appropriate mitigation strategies are implemented, about 2 billion people might be affected by desertification effects; and, over the next decade, 50 million might be displaced.

Accelerating temperature rise over the past 10 years increased the drought in Australia—worse in the most populated areas—so that the situation got to national crisis proportions. Although equipped with the highest water storage capacity per capita in the world, in the major cities supply might fall 40% short of demand by 2025 due to growing population and possibly more severe drought. In China, because of drought, more than 8 million people are short of water, and many livestock perish. In Sichuan province, armed police deliver water to the nearly 4 million people affected by severe drought.

The European Commission Green Paper 'Adapting to Climate Change in Europe - Options for EU Action' warns that unless advanced planning occurs, European countries will suffer "increasingly frequent crises and disasters" that will "threaten Europe's social and economic systems and its security."

8.5.3 Post-Kyoto Negotiations

The most important developments on post-Kyoto negotiations include:

- Leaders attending the recent Heiligendamm (Germany) G8 summit agreed to seek "substantial" cuts in greenhouse gas emissions, and to launch negotiations at the December

2007 UN Summit for eventually reaching agreement on a new—more inclusive—UN-led treaty by 2009. EU, Canada, and Japan supported a target of a cut to 50% of the 1990 emissions level by 2050.

- Denmark began preparing for the 2009 UN climate summit that it will host. However, it admits that reaching a political agreement on a new global climate treaty to replace the current Kyoto Protocol will not be easy.
- Ahead of the September Asia Pacific Economic Cooperation summit, Australia's Prime Minister John Howard is seeking to launch negotiations for an Asia-Pacific new climate agreement and to use the summit for including emerging high emitters as China and India in a post-Kyoto accord.
- Norway plans to become the world's first "carbon neutral" country, by reducing its emissions to zero by 2050, or paying for equivalent reductions elsewhere.
- The UN Secretary General will hold a special high-level meeting on climate change prior to the September Heads of State and Government summit. He called climate change the "defining issue of our era."

Military Implications:

[Same as previous on similar issues] Increasingly evidence and warnings on climate change amplify the international discourse and increase the 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](#))

Research Finds That Earth's Climate is Approaching 'Dangerous' Point

http://www.nasa.gov/vision/earth/environment/danger_point.html

NASA Researcher Finds Days of Snow Melting on the Rise in Greenland

<http://earthobservatory.nasa.gov/Newsroom/NasaNews/2007/2007052925071.html>

Tuvalu Envoy Takes Up Global Warming Fight

<http://www.npr.org/templates/story/story.php?storyId=10950375>

UN agencies, partners call on wealthy nations to adopt emission targets

<http://www.un.org/apps/news/story.asp?NewsID=22801&Cr=climate&Cr1=change>

Beyond Disasters: Creating Opportunities for Peace

<http://www.worldwatch.org/node/5111>

Desertification: Experts Prescribe Global Policy Overhaul to Avoid Looming Mass Migrations

<http://www.unu.edu/media/archives/2007/files/mre29-A-07.pdf>

Adapting to Climate Change –Launching a public debate on options for EU Action

<http://ec.europa.eu/environment/climat/pdf/eccp/adapting.pdf>

Australia's Howard Plans Asia-Pacific Kyoto Successor

<http://www.planetark.com/dailynewsstory.cfm/newsid/42494/story.htm>

Climate Change 'Defining Issue of Our Era,' Says Ban Ki-Moon, Hailing G8 Action

<http://www.un.org/apps/news/story.asp?NewsID=22836&Cr=&Cr1=>

Call For "Disaster Diplomacy" as Millions Are Affected

<http://www.worldwatch.org/node/5127>

8.6 The Disputes over the Northern Territories Set to Continue

As the North is warming up, opening access to its rich resources, the territorial claims over the Arctic region are set to increase. Reportedly, Russia is prepared to challenge the international community and claim sovereignty over large parts of the Arctic region that is now under the

International Seabed Authority, on grounds of the region's geological continuity and similarity with continental Russia. [See also *New Canadian Strategies for Monitoring the Northwest Passage* in August 2006, and *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security reports.]

Military Implications:

It is likely that discussions for clear international regulations concerning the Arctic region will increase rapidly, and more military action will be called for to ensure the safety of individuals and ecosystems. Relevant military personnel should cooperate with their counterparts in other countries and international organizations in developing timely, adequate national and international regulations and enforcement procedures regarding the Arctic.

Source:

Putin's Arctic invasion: Russia lays claim to the North Pole - and all its gas, oil, and diamonds
http://www.dailymail.co.uk/pages/live/articles/news/worldnews.html?in_article_id=464921&in_page_id=1811

8.7 Idle Nighttime Computers Cited as Energy Wasters

A new report released by the energy management firm 1E and the Alliance to Save Energy points out the large amount of energy now being wasted by idle computers left running at night. The study calculated that 14.4 million tons of CO₂ could be eliminated annually from atmospheric pollution in the U.S. if all of these machines were turned off when not being used for extended periods.

Military Implications:

Military installations should review their policies and operations and turn off all possible computers.

Sources:

Energy Awareness Campaign

<http://www.1e.com/energycampaign/index.aspx>

PC Energy Report Released Today Shows That Shutting Down Your PC at the End of the Work Day Will Have a Major Impact on Business Savings and Reducing CO₂

<http://www.csrwire.com/News/8951.html>

8.8 Nanotechnology Safety Issues**8.8.1 French Group to Study Nanotech Environmental Health and Safety**

The Observatory for Micro and NanoTechnologies (Minatec, France), a part of the National Center for Scientific Research (CNRS), has launched a working group to study the possible effects of nanoparticles and nanomaterials on the environment and human health. The aim is to enable non-specialists to keep up-to-date with the rapid evolution of the field of nanotoxicology. The group will consist of 14 experts meeting three times a year.

8.8.2 New Nano Risk Framework

DuPont and Environmental Defense have released the Nano Risk Framework, jointly developed guidelines for evaluating the safety and environmental risks of nanotechnology products. The 87-page report, almost two years in the making, includes three examples of how DuPont applied the framework.

Military Implications:

[Same as previous on similar issues] Relevant military personnel should review information generated by these assessments on nanotech environmental health and safety 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:

Establishing a working group on the effects of nanoparticles and nanomaterials on the human health and the environment

<http://www2.cnrs.fr/presse/communique/1104.htm> (French website; short description translated in the [Appendix](#))

Nano Risk Framework: <http://www.nanoriskframework.com/page.cfm?tagID=1095>

Item 9. Reports Suggested for Review**9.1 Worldwatch Institute: Assessing the Relation between Disasters and Conflict**

Beyond Disasters: Creating Opportunities for Peace, a report by Worldwatch Institute: analyses the nature and effect of disasters over the past 20 years and the impacts of human activities on the climate; highlights the factors of vulnerability; and makes a few recommendations to reduce the social consequences of disasters and to eventually use post-disaster reconstruction as an opportunity for building lasting peace. The report considers three case studies: Aceh, 2004 Indian Ocean tsunami—that became a catalyst for peace; Sri Lanka—despite the ceasefire, the conflict continued mainly because of an inadequate post-disaster reconstruction strategy; and Kashmir—the earthquake didn't influence the stalled reconciliation process.

Military Implications:

The Worldwatch report might be a source of information for future efforts to address disaster and conflict.

Source:

Beyond Disasters: Creating Opportunities for Peace

<http://www.worldwatch.org/node/5126>

Beyond Disasters: Creating Opportunities for Peace

http://www.wilsoncenter.org/index.cfm?fuseaction=events.event_summary&event_id=244464 (video)

9.2 SIPRI Year Book 2007 Points out Environmental, Nuclear, and Energy Threats

The 2007 edition of the authoritative Stockholm International Peace Research Institute (SIPRI) Yearbook, along with statistics on conflict and weapons expenditure, highlights the main categories of threats to peace that the world faces. Among the main threats, it lists: energy, which “could become a weapon”; and the environment, highlighting that “Using the world’s resources to address hunger, environmental factors and poverty is likely both to improve human survival and to strengthen international security.” Concerning nuclear, chemical and biological threats, the report warns on high uncertainties of the stockpiles and research around the world and calls for increased transparency and better policies for risk assessments and risk-remediation strategies.

Military Implications:

The report's recommendations should be considered for improving compliance and international treaties enforcement, as well as developing international regulations to cover new types of threats.

Sources:

SIPRI Yearbook 2007

<http://yearbook2007.sipri.org/>

SIPRI Warns of Growing Nuclear Risks

http://www.nti.org/d_newswire/issues/2007_6_12.html#7DADDB8B

9.3 Cleantech Report™ by Lux Research

Cleantech Report™ by Lux Research is a comprehensive analysis of emerging energy and environmental technologies with information ranging from statistics to funding and policies on cleantech. It notes that cleantechs are rapidly expanding; 1,500 cleantech start-ups operate worldwide, there were 29,874 cleantech-related scientific journal articles published in 2006, and 4,093 patents issued in the U.S. alone.

Military Implications:

Relevant military personnel should review *Cleantech Report™* for information on technologies and trends that might have military implications and possibilities for implementing the *Army Strategy on the Environment*. [Definition note: cleantech seems to encompass technologies, products and procedures that are typically called “green”, meaning beneficial or less damaging to the environment than others in current or past use.]

Source:

The Cleantech Report™

<http://www.luxresearchinc.com/cleantech.php>

9.4 Environmental Change and Security Annual Report

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

Military Implications:

Those military and civilian personnel with international environmental responsibilities should review the report.

Source:

ECSP Report 12

http://www.wilsoncenter.org/index.cfm?topic_id=1413&fuseaction=topics.publications&group_id=240703

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

Item 4. International Crisis Group to Debate Considering Climate Change Variable in Conflicts

Rainfall records could warn of war

Jim Giles, NewScientist.com, 30 May 2007

EVERY month, the International Crisis Group makes predictions it hopes won't come true. The non-profit organisation, which has its base in Brussels, Belgium, monitors regions where conflict is brewing. By tracking precursors of armed struggle, such as political instability, it raises awareness about looming wars in the hope of stopping conflicts before they begin. And as of this month, it will start talking about whether to include another variable in its analyses: climate change.

The discussions come after a wave of interest in the link between climate change and conflict. Last month, a group of retired US admirals and generals said global warming would act as a "threat multiplier", with events such as droughts toppling unstable governments and unleashing conflict. The UN Security Council has devoted time to the matter, and media reports have described the crisis in Darfur, Sudan, as the first "climate change war", due to the decades of droughts that preceded the conflict.

Marc Levy at Columbia University in New York, who is working with the ICG, is one of the few researchers who have been able to support these speculations with data. In a forthcoming paper, he and colleagues combine databases on civil wars and water availability to show that when rainfall is significantly below normal, the risk of a low-level conflict escalating to a full-scale civil war approximately doubles in the following year.

Parts of Nepal that witnessed fighting during the 2002 Maoist insurgency, for example, had suffered worse droughts in preceding years than regions that were conflict-free. Although Levy is not sure why the link should exist in this case, studies of other conflicts suggest explanations. Drought can cause food shortages, generating anger against governments, for example. "Semi-retired" armed groups may return to conflict in these situations.

Levy wants to see if a model based on the link between rainfall and climate can help aid agencies. For each of the 70 or so locations on the ICG's watch list, he will use rainfall measurements and forecasts to calculate the impact the weather is having on conflict risk. That analysis is likely to flag up the Ivory Coast among others, he says. A 2003 peace accord ended years of violence in the

country, but many armed groups have not surrendered their weapons. Ongoing drought in the north might soon destabilise the country and trigger a return to violence, Levy says.

Including rainfall would be a fairly basic addition to the analyses that the group performs, but it could be the start of a major change in thinking. If the rainfall data helps, information on floods and severe storms could be added, for example. "We're starting to see a real focus on this," says Dan Esty of Yale University. "Suddenly people are making the link."

Not everyone is as confident of the link as Levy, however. Over a decade ago, the CIA set up the Political Instability Task Force to produce models that can flag up vulnerable governments. It relies on variables such as infant mortality, which measures the strength of a country's health system. Although events such as droughts cause tension, the models showed it is other factors that determine whether tension becomes conflict.

"Research has not succeeded in establishing robust, systematic connections between climate and conflict," says Halvard Buhaug of the International Peace Research Institute in Oslo, Norway. With the connection still under debate, it may be too early to talk about climate change wars. "So far, climate change has not been powerful enough to be the main driver of conflict," says Jack Goldstone at George Mason University in Fairfax, Virginia. "Drought was a contributory factor in Darfur, not the main cause."

Yet many researchers say that this uncertainty should not stop Levy from working with aid groups. They say droughts and floods add to the pressure on governments and need to be monitored. A simple link may not exist, says Esty, but climate change will exacerbate issues known to be linked to conflict.

From issue 2606 of *New Scientist* magazine, 30 May 2007, page 12

Item 7. Technological Breakthroughs with Environmental Security Implications

7.3 New Material Has High Absorbency for Organic Solvents

New Material Has High Absorbency for Organic Solvents

Kyushu University developed new material, which can absorb large amount of organic solvent such as chloroform. Japan Chemical Information of May/2007

Nikkei Sangyo 1/May/2007

Kyushu University developed new material, which can absorb large amount of organic solvent such as chloroform. The material developed is jerry type material including ionic material easily mixed with oil. The material developed can absorb 480 times weight dichloromethane, 380 times weight tetra-hydrofurane, 300 times chloroform, respectively. This material could be used for absorbing oil from tanker or VOC (vaporized Organic Compounds) from factory.

Item 8. Updates on Previously Identified Issues

8.3 Japanese Chemical Weapons Cleaning in China Yet to be Completed

Japanese chemical bomb unearthed in north China

http://english.people.com.cn/200706/15/eng20070615_384705.html

A Japanese wartime chemical bomb has been unearthed in Bayannaoer City in north China's Inner Mongolia, Chinese military experts said on Friday.

The rusty bomb, about 81 centimeters in length and buried seven meters under ground, was unearthed at a construction site when workers were laying the groundwork for a residential building with a tracked excavator.

Liquid began to leak from the bomb after it was cracked by the excavator and workers who smelt the liquid began to feel nauseous and dizzy, local sources said.

Local authorities quickly sealed off the construction site and workers were rushed to hospital.

Chinese military experts, who scrutinized the construction site and the bomb, believed that the bomb, filled with mustard gas, was dropped by the Japanese air force during its war against China.

The bomb failed to explode and lay buried underground for decades, the experts said.

An oily, volatile liquid, mustard gas is corrosive to the skin and mucous membranes and causes severe, sometimes fatal respiratory damage. It was used in World War II as a chemical warfare agent.

Local sources said that the Chinese authorities will ask the Japanese government to destroy the bomb.

All the people who were exposed to the bomb are now out of danger, according to local sources.

Chinese military experts said that the Japanese army used toxic chemical weapons during its invasion of China, killing many Chinese soldiers.

In one of the darkest secrets of World War II, the Japanese Imperial Forces set up Unit 731 -- specialized in chemical warfare -- in northeast China's Heilongjiang Province. Under the leadership of the callous Shiro Yishii, Unit 731 conducted biochemical experiments mainly on Chinese civilians to develop ghastly germ warfare weapons that could spread bubonic plague, typhoid, anthrax and cholera.

Chinese official statistics show Japan abandoned at least two million tons of chemical weapons at about 40 sites in 15 provinces at the end of World War II, mostly in the three northeast provinces of Heilongjiang, Jilin and Liaoning.

China and Japan joined the United Nations Chemical Weapons Convention in 1997. Two years later, they signed a memorandum obliging Japan to remove all weapons by June 2007 and provide all necessary funds, equipment and personnel for their retrieval and destruction.

Source: Xinhua

Japan rules against war claims

By HIROKO TABUCHI, Associated Press Writer Thu May 10, 6:42 AM ET

<http://www.guardian.co.uk/worldlatest/story/0,-6622616,00.html>

TOKYO - Japan's Supreme Court rejected compensation claims by Chinese victims of atrocities committed by Japan in the 1930s and 40s, which included the use of biological weapons and a massacre in the city of Nanjing, defense lawyers said Thursday.

In two separate decisions made Wednesday, the top court upheld rulings by lower courts since 1999 that the current Japanese government was not liable for compensation demands from foreign citizens for wartime actions, according to defense lawyer Norio Minami.

The plaintiffs from the two cases, who totaled 198 people including the families of the victims, had demanded apologies and combined compensation worth \$15.8 million for death and suffering caused by wartime biological experiments, the so-called "Rape of Nanjing," and the firebombing of Yong'an city in China's Fujian province.

"These are unjust decisions that ignore the human rights and personal suffering of the defendants," Minami said. "The Supreme Court has completely neglected its responsibility to uphold justice."

Of the 180 plaintiffs involved in one of the cases, which sought compensation for biological warfare experiments, only 10 are actual survivors, the rest are relatives, lawyer Shuji Motonaga said. The remaining 18 plaintiffs sought payback for germ warfare, the Nanjing occupation and the bombing of Yong'an, said Masahiko Yamada, one of that group's attorneys.

The court refused to provide details of Wednesday's decisions.

But despite Wednesday's rejection, a lower court ruling in 1999 acknowledged that a special section within the Imperial Army, known as Unit 731, used biological weapons against China.

The Japanese government has never formally apologized over its germ warfare program or its rampage in Nanjing. The government acknowledged a germ warfare unit existed, but has remained mum on its details.

Historians estimate that Unit 731 may have killed as many as 250,000 people in their experiments — which included vivisections of Chinese prisoners and the use of germs — during the 1930s and '40s, when Japanese troops occupied much of China.

Researchers generally agree Japan's military also slaughtered at least 150,000 civilians and raped tens of thousands of women during its 1937-38 occupation of Nanjing. The Chinese government puts the number of dead at more than 300,000.

According to defense lawyers, Japan's bombings of Yong'an killed or injured more than 10,000 people in 11 raids from 1938 to 1943.

Tokyo's stand has long been that compensation claims were settled under postwar treaties between Japan and other nations. None of Unit 731's members has ever been tried for the killings.

Japan's refusal to compensate victims has fueled views among many Chinese that Tokyo has never sufficiently atoned for its brutal occupation.

8.5 Climate Change—Research Aspects

Sources—a more expanded list:

Research Finds That Earth's Climate is Approaching 'Dangerous' Point

http://www.nasa.gov/vision/earth/environment/danger_point.html

Dangerous human-made interference with climate: a GISS modelE Study

http://pubs.giss.nasa.gov/docs/2007/2007_Hansen_etal_1.pdf

Rising sea level forecasts understated, say scientists

<http://www.abc.net.au/news/stories/2007/06/20/1957115.htm>

Global and regional drivers of accelerating CO2 emissions

<http://www.pnas.org/cgi/content/abstract/0700609104v1>

Alarming acceleration in CO2 emissions worldwide

http://www.carnegieinstitution.org/news_releases/news_2007_0521a.html

Value of satellites highlighted at World Environment Day

http://www.esa.int/esaEO/SEMBUUEVL2F_planet_0.html

NASA Researcher Finds Days of Snow Melting on the Rise in Greenland

<http://earthobservatory.nasa.gov/Newsroom/NasaNews/2007/2007052925071.html>

Barroso sees 'dramatic' climate change in Greenland

<http://euobserver.com/9/24356/?rk=1>

Tuvalu Envoy Takes Up Global Warming Fight

<http://www.npr.org/templates/story/story.php?storyId=10950375>

Global Platform for Disaster Risk Reduction

<http://www.preventionweb.net/globalplatform/>

UN agencies, partners call on wealthy nations to adopt emission targets

<http://www.un.org/apps/news/story.asp?NewsID=22801&Cr=climate&Cr1=change>

One man's battle to hunt down typhoons

http://news.independent.co.uk/sci_tech/article2652805.ece

Beyond Disasters: Creating Opportunities for Peace

http://www.wilsoncenter.org/index.cfm?fuseaction=events.event&event_id=244464# (video)

Beyond Disasters: Creating Opportunities for Peace

<http://www.worldwatch.org/node/5111>

Re-thinking Policies to Cope with Desertification

http://www.inweh.unu.edu/inweh/drylands/IYDD_Policy_Brief.pdf

Desertification: Experts Prescribe Global Policy Overhaul to Avoid Looming Mass Migrations

<http://www.unu.edu/media/archives/2007/files/mre29-A-07.pdf>

Australia - the continent that ran dry

<http://environment.newscientist.com/channel/earth/mg19426085.300;jsessionid=CFNDNHPPHLOB>

(by subscription only; full text in this [Appendix](#))

Armed police deliver water to drought-hit Sichuan

<http://www.alertnet.org/thenews/newsdesk/PEK157663.htm>

China Drought Causes Water Shortages for Millions

<http://www.planetark.com/dailynewsstory.cfm/newsid/42773/story.htm>

Mudslides, floods kill nearly 130 in Bangladesh

<http://uk.reuters.com/article/homepageCrisis/idUKSP1987.CH.242020070612>

Adapting to Climate Change –Launching a public debate on options for EU Action

<http://ec.europa.eu/environment/climat/pdf/eccp/adapting.pdf>

Secretary-General Welcomes G-8 Agreement on ‘Strong and Early Action’ To Combat Climate Change

<http://www.un.org/News/Press/docs//2007/sgsm11029.doc.htm>

Australia's Howard Plans Asia-Pacific Kyoto Successor

<http://www.planetark.com/dailynewsstory.cfm/newsid/42494/story.htm>

Denmark seeks global climate deal in 2009

<http://euobserver.com/877/24147/?rk=1>

Climate Change ‘Defining Issue of Our Era,’ Says Ban Ki-Moon, Hailing G8 Action

<http://www.un.org/apps/news/story.asp?NewsID=22836&Cr=&Cr1=>

Struggling to save the planet. *The Economist*, May 31st 2007

http://www.economist.com/world/international/displaystory.cfm?story_id=9261663

Call For “Disaster Diplomacy” as Millions Are Affected

<http://www.worldwatch.org/node/5127>

Australia - the continent that ran dry

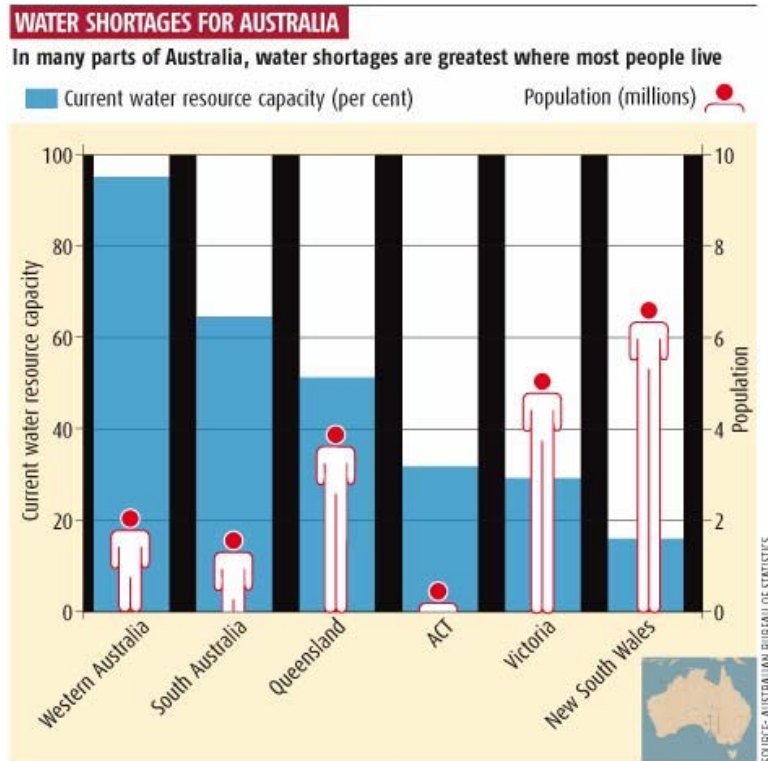
NewScientist.com news service, 13 June 2007

By Rachel Nowak

IN THE beginning the Australian drought was fun. A talking point over the barbecue, an excuse to shower with a lover or spend more cloud-free days with friends at the beach. Tales of thirst-crazed camels rampaging through country towns merely added to the excitement.

Sometime last year, the mood changed - perhaps with the first inkling that water restrictions had all but destroyed urban gardens and that agricultural production across the country had fallen by a fifth. Last month, when water storage fell so low that energy supplies were threatened, the sense of panic became palpable. Australia is facing a national crisis, one that promises to transform the country, inexorably changing where people live, what they eat, what they do in their spare time, and - most threatening of all - their future economic well-being.

Whether Australia can adapt remains to be seen, and water experts around the world will be following closely as regions as far afield as the south-east and south-west US, and south-west China grapple with their own droughts. "Water will still come out of the tap, but at what cost?" asks Chris Mitchell of CSIRO Marine and Atmospheric Research (CMAR) in Melbourne. "Will we adapt and ameliorate the problem or adapt and exacerbate it."



<http://environment.newscientist.com/data/images/archive/2608/26085301.jpg>

Across the continent, average rainfall has actually increased marginally over the past century. But there has been a shift in where rain falls. Since the 1970s the unpopulated regions of the north have got wetter, but the southern and eastern regions, where most people live, are drier.

To make matters worse, Australia's average temperatures have been increasing at an accelerating rate in the past 20 years. Seven of the past 10 years have been hotter than average, and four states have just clocked up their warmest autumn on record. Higher temperatures increase evaporation, making a bad drought even worse.

Today large swathes of six of Australia's seven states and territories, and all of Australia's major cities, are officially "in drought" and have been for years. That's in spite of the rain that has fallen over the past few weeks, and the once-in-30-years storms and floods that hit Hunter valley, north of Sydney, last weekend. Because the land is bone dry, it has simply sucked up the rain. That has helped some farmers but water run-off is still well below average and the level of reservoirs remains perilously low (see Diagram).

Melbourne's water storage stands at 28 per cent of its capacity. Sydney's is at 37 per cent. Perth, where rainfall has fallen 15 per cent in the past half-century, and inflows into the dams by more

than 40 per cent, now accepts drought as the norm, and has dropped its expected annual catchment from 340 to 180 gigalitres. Last year, just 120 gigalitres flowed into its dams.

"People have been taken by surprise at the speed this has happened," says John Langford, director of UniWater, a research initiative shared by Monash and Melbourne Universities. What makes the Big Dry more shocking is that just 10 years ago, Australia was considered drought-proof. Precisely because the country is so susceptible to huge variations in rainfall, the nation-builders of the 1950s and 1960s equipped city and country with massive multi-year reservoirs, providing the highest water storage capacity per capita in the world, and plumbed in hundreds of kilometres of irrigation channels. What they hadn't bargained for was the thirst of the country's growing population, or just how brutal a drought could be.

Australia sits at the centre of three oceans, the Indian, the Pacific and the Southern. Its reputation as the driest inhabited continent on Earth, and the one with the most variable rainfall (in the 1970s, large parts of Australia were beset with floods), depends on a complex interplay between these oceans and the atmosphere.

The best understood system is the El Niño-Southern Oscillation. During El Niño events, which usually peak in the Australian summer, warm water develops in the eastern and south-eastern tropical Pacific, triggering differences in air pressure that drive rain that should fall onto eastern Australia out over the ocean. Australia has had two such El Niños in quick succession, one in 2002 and 2003, and one in 2006 and 2007, with no intervening wet periods.

Since 1997, the Indian Ocean Dipole - a cooling of the tropical eastern Indian Ocean, and a warming of the west - has also been more active, reducing spring rains in south-east Australia. Finally, winter rains have dropped off due to changes in the Southern Annular Mode, a climate pattern that prevents rain-bearing low-pressure systems reaching southern Australia.

A large portion of the drought-inducing changes is undoubtedly due to natural variation. But there is the possibility that climate change, especially rising temperatures, has turned a severe drought into a historic one. In Australia's worst-hit region, Perth and the south-west, increases in greenhouse gases account for about half of the reduction in rainfall, according to an analysis of 70 experiments using 21 climate models by Wenju Cai of CMAR and CSIRO colleague Tim Cowan (Geophysical Research Letters, vol 33, p L247098).

For many water experts the spectre of climate change makes arguments over the cause of the current drought almost irrelevant: the most recent assessment by the Intergovernmental Panel on Climate Change was confident that climate change would make the southern regions of Australia where most people live warmer and drier, and more susceptible to extreme variations in weather. In other words, Australia may survive this drought, but there will be more to come.

"For our major cities, supply will fail to meet demand by 40 per cent by 2025. We will need another 800 to 1000 gigalitres per year," says Tom Hatton, director of CSIRO's Water for a Healthy Country Flagship. In comparison, Perth, Australia's fourth largest city, uses 300 gigalitres a year. "That's based on projected population growth, and in hindsight, on rather optimistic

estimates of the improved efficiency with which we can use water, and rather conservative estimates for declines in rainfall."

Can technology keep the water flowing? All but the greenest policy-makers now see desalination plants as essential, at the very least as back-ups to see Australia through this and future droughts. But you need huge amounts of energy to pump seawater through membrane filters, and the waste brine created by desalination is bad news for the environment.

Perth completed its first desalination plant last year, with a new wind farm being built to supply the electricity and offset the 24 megawatts required to run the plant. Desalination now supplies 17 per cent of the city's drinking water and a second plant has been commissioned. Sydney is building one, and Melbourne is expected to follow suit. Industrial plants which depend on a secure water supply, such as BHP Billiton's copper and uranium mine in South Australia, are considering building their own large desalination plants.

Recycling waste water could be a more sustainable option because it uses roughly a third of the energy required to desalinate seawater. But last year Toowoomba, Queensland's largest inland city, overwhelmingly voted to reject adding recycled effluent to the water supply, making politicians elsewhere nervous about introducing similar measures. Nonetheless, Queensland's government hopes to start recycling sewage before Brisbane's main water supply runs dry early in 2009. Most experts agree that recycled water will be supplementing Australian drinking supplies within the decade.

Even the politically unpopular and costly option of piping water from one catchment area to another - robbing Peter to pay Paul - will become more common. "Desalination, recycling and piping all cost more energy per unit volume of water than traditional reservoirs," says Hatton. That worries climate experts, because more energy tends to mean more greenhouse gases, which in turn will exacerbate climate change and future droughts.

Hatton believes we can still save the day by reducing demand for water, for example by increasing its price, and by making the same water stretch further. The Water for a Healthy Country Flagship is developing new techniques to bring down the economic and environmental costs of desalination and recycling, and to improve how water use is measured, which in turn will make water use more efficient. It is also working on new storage techniques, including "managed aquifer recharge", in which partly recycled water is pumped into underground aquifers. Not only does that reduce evaporation, which can be significant from a dam surface, but water quality also improves with time as pathogens die off.

Not everyone is convinced this will be enough. "You can fiddle around with technology, but there is a limit to the amount of water available. Population needs to be part of the discussion," says Graeme Pearman, director of the Monash Sustainability Institute at Monash University in Melbourne. He and others say people are failing to address the impact of Australia's burgeoning population, expected to grow from 21 million to between 25 and 33 million by 2051, for fear of appearing racist or anti-development.

That attitude may be starting to change. In March, delegates at a high-profile conference in Canberra on population and water use discussed the need both for a national population policy that took into account the scarcity of resources such as water, and for more strategic regional planning that ensures new settlements follow the water rather than vice versa.

Barney Foran, a policy analyst at The Australian National University in Canberra, says Australians must also address their per capita water use. When you factor in the water used to make products such as food, drink, clothing and newspapers, the average Australian consumes roughly six to eight times more water than what their domestic water meter records, with more affluent Australians consuming twice as much as less affluent ones.

Meanwhile, illogical as it seems, the biggest obstacle to dealing with an ever drier Australia could be rain itself. "We have a window of opportunity," says Quenton Grafton of The Australian National University. "My concern is that if the drought breaks then people's attention will move on to something else. Five years down the track when we have another drought - which will happen - we won't be ready."

Murray river system dries up

Talk about drought in Australia, and conversation quickly turns to the Murray-Darling Basin (MDB). This monster river system symbolises the difficulties of divvying up an ephemeral resource like water.

The rivers of the MDB cross four states and one territory, each of which hands over some of its water management responsibilities to a mishmash of often overlapping local authorities. Add in a shrinking water supply, a growing population, and the competing needs of irrigation, industry, the environment and water for drinking, and it is easy to see why no one's happy.

Long before the current drought, water extraction had pushed the MDB to breaking point, slowing its rivers, increasing their salinity and nutrient concentrations, and altering their temperatures. With the drought, farmers, who rely on the MDB to produce 40 per cent of the nation's food and fibre, are suffering too - their pain became international news in April when Prime Minister John Howard announced that they won't see a drop of irrigation water until significant rains fall.

Nor are city dwellers happy. The Murray was once the most reliable source of water for Adelaide, a city of 1.1 million. Now the river threatens to fall below the level of the pumps.

The latest attempt to rectify the situation is Howard's "National Plan for Water Security", revolving around revamping irrigation in the MDB. Its aims, to give farmers less water and to better police and measure water in the basin, have won support from water experts. Others fear that plans to plug leaks in the hundreds of kilometres of decrepit irrigation channels will backfire on the environment: up to 60 per cent of the leaking water returns to the rivers, bolstering what little flow there is.

What everyone agrees is that agriculture in the MDB will change. At the very least, the amount of irrigated pasture for dairy will decrease. Some farmers may even move to the wet, northern reaches of the continent - an option being examined as part of Howard's new plan.

"The current pattern of agriculture and settlement was based on a certain set of climatic conditions. If they don't continue, everything gets thrown up in the air," says Daniel Connell of The Australian National University in Canberra, author of *Water Politics in the Murray-Darling Basin*.

Keeping cool over energy

"You can't put a tight little boundary around the water issue," says Barney Foran, a policy analyst at The Australian National University in Canberra. As well as being a trade, environment and population issue, it is an energy issue, he says.

In the last few months dwindling water supplies have forced Victoria's major power stations to buy in water for cooling to supplement local sources. Queensland has turned off two of its generators, reducing its total capacity by 700 megawatts. Meanwhile, dams holding water to power hydroelectric turbines in the snowy mountains of New South Wales are at their lowest levels, containing just 8 per cent of the water once available for power generation. That has forced the government to temporarily waive environmental restrictions to allow fuller use of gas-fired power plants.

Water scarcity has also helped double the wholesale price of electricity from A\$30 (\$25) to A\$60 per megawatt-hour. According to a recent report from the National Electricity Market Management Company, which manages most of Australia's electricity supply, the lack of water could cut the total energy available by up to 10 per cent by late 2008. Such a shortfall would drive up electricity prices, and lead to rationing and rolling blackouts during the summer, when air conditioners send electricity consumption soaring.

From issue 2608 of *New Scientist* magazine, 13 June 2007, page 8-11

8.9 Nanotechnology Safety Issues

8.9.1 French Group to Study Nanotech Environmental Health and Safety

French Group to Study Nanotech Environmental Health and Safety

Establishing a working group on the effects of nanoparticles and nanomaterials on the human health and the environment (Création d'un groupe de travail sur les effets des nanoparticules et nanomatériaux sur la santé et l'environnement)

<http://www2.cnrs.fr/presse/communiqu/1104.htm> French website; short description translated: The Observatory of the Micro & Nanotechnologies (OMNT), accommodated within the Minatoc pole, in immediate proximity of the RTRA "Nanosciences at the limits of nanoelectronic", announced the creation of a multidisciplinary working group that would ensure a scientific supervision related to the effects of the nanoparticles and nanomaterials on health and the environment. The objective is to help non specialists to be kept informed of the evolution of this

field through summaries that will present in an objective way the most outstanding results published in the world.