

1

**Climate Change and
Military Conflict**

Dr Stuart Parkinson



<http://www.sgr.org.uk/>

Presentation given to the Annual General Meeting of the Movement for the Abolition of War at the Imperial War Museum, London, UK on 9 November, 2008.

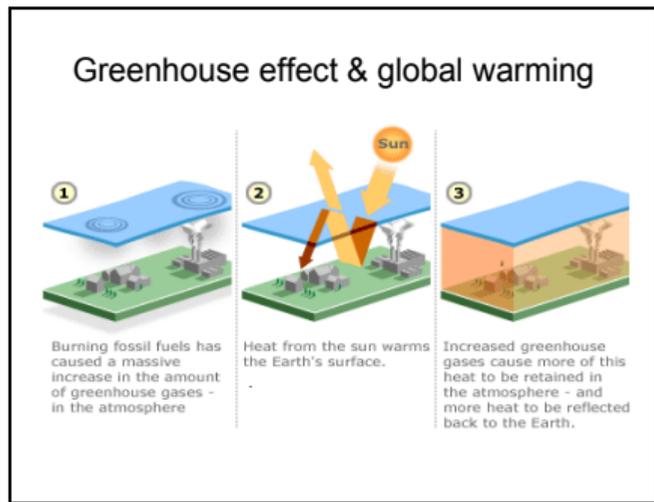
2

Climate change and military conflict

- Climate change
 - What's happened so far
 - Future impacts
- Potential for military conflict
- Tackling the problems

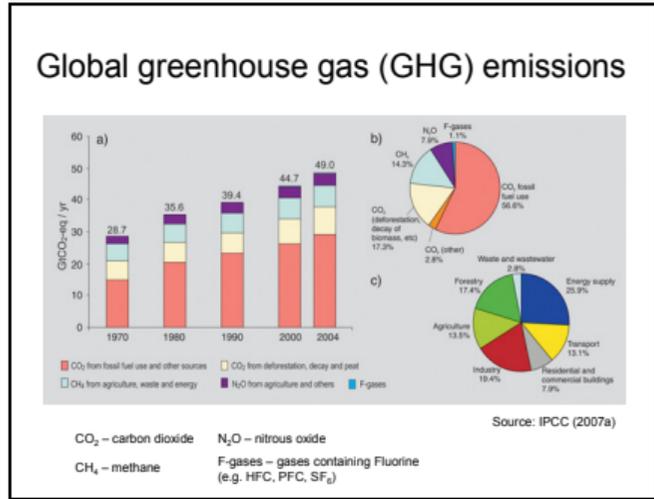
3

Climate change:
what's happened so far



Source: BBC website

5



- (a) Global annual emissions of anthropogenic GHGs from 1970 to 2004
- (b) Share of different anthropogenic GHGs in total emissions in 2004 in terms of CO₂ equivalent (CO₂-eq).
- (c) Share of different sectors in total anthropogenic GHG emissions in 2004 in terms of CO₂-eq. (Forestry includes deforestation).

Military contribution to climate change

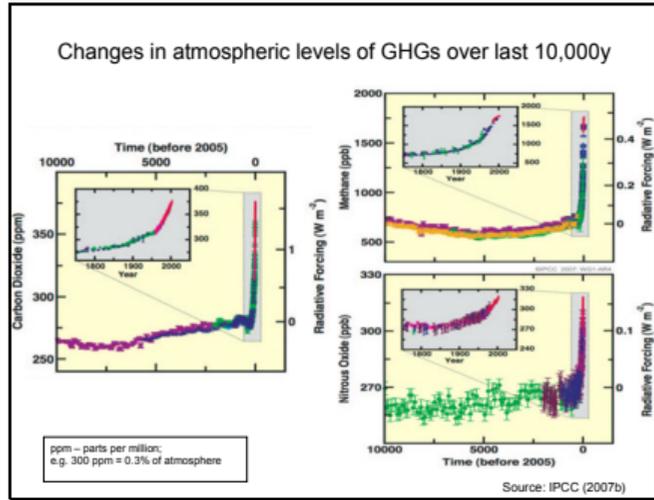
- Emissions of CO₂ from military forces
 - USA: ~60 million tonnes in 2005
 - 1% of total USA emissions
 - similar to Finland's total emissions
 - UK: ~5 million tonnes in 2005
 - 1% of total UK emissions
 - similar to Senegal's total emissions
 - War in Iraq: ~141 million tonnes since 2003
 - annual emissions similar to Peru

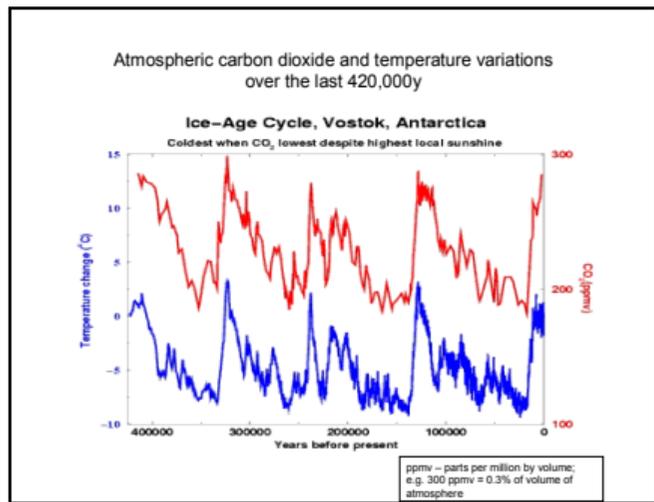
Military CO₂ emissions for USA and UK estimated by SGR based on data from DESC (2006) & MoD (2006).

Figures for Iraq war are from Reisch & Kretzmann (2008)

Covering period Mar 2003 to Oct 2007

includes fuel consumption of US military in Operation Iraqi Freedom, upstream emissions & emissions of cement used in rebuilding

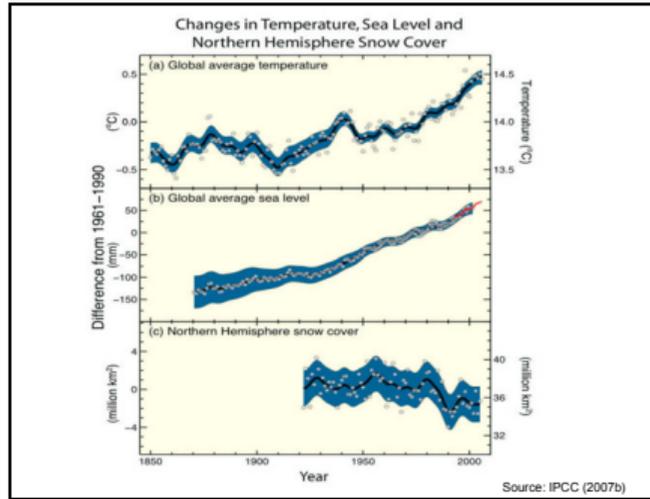




Data from Petit et al (1999)

Latest data shows that CO₂ levels are now higher than for at least 650,000 years

9



Current temp is 0.76°C higher than in ~1875 – likely higher than at any time in the last 1300 years
Sea level – ~17cm rise over 20th century (due to water expansion + ice melting)
From IPCC (2007b)

Examples of impacts so far

- Loss of coastal wetlands & increasing damage from coastal flooding
- Changes in heat-related deaths in Europe
- Reduced growing season in the African Sahel
- Numerous changes in ecosystems
- World Health Organisation estimate:
 - 150,000 deaths due to climate change in year 2000

World Health Organisation (WHO) estimate is based mainly on assessments of changes in death rates due to heat stress and infectious disease

Other examples:

Extreme weather – widespread increases in storm activity (including more intense hurricanes in some regions), increases in occurrences of drought

Of 29,000 good quality environmental data sets that are available, 89% show changes consistent with a warming world

All data from IPCC (2007c) except for World Health Organisation study which is from WHO (2003)

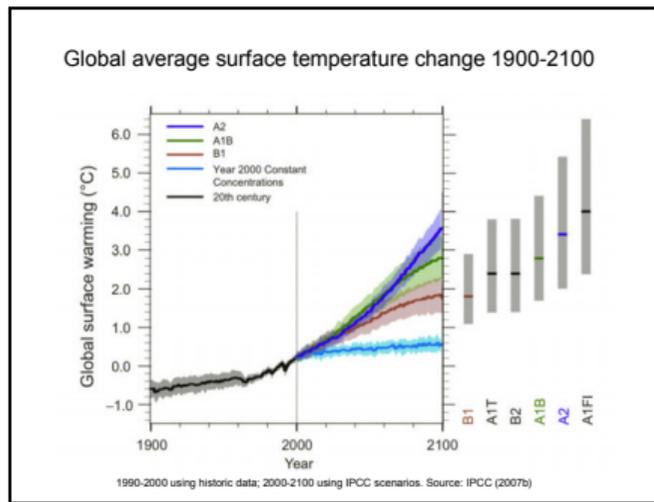
11

Climate change: the future

Continued increases in emissions

- Future scenarios project increases of global GHG emissions by 25-90% between 2000 and 2030
- Our current path is taking us towards the upper end of the range

Source: IPCC (2007a)



Predicted temp in 2100 will be between 1.1°C and 6.4°C higher than 1990 (IPCC, 2007b)

For comparison, the temperature difference between the Ice Ages and the warm interglacial periods such as at present has been 4-7°C (IPCC, 2007d)

Available evidence indicates that the upper end of this range would represent a faster change than at any time in the last 50 million years (IPCC, 2007d)

Light blue curve – ‘thought experiment’ based on what would happen if we had stopped emitting GHGs in 2000

Main direct impacts

- Fresh water resources
- Coastal areas
- Food supplies
- Human health
- Ecosystems

Fresh water resources

- Dry areas likely to get drier, wet areas get wetter
 - Major changes in rivers & water availability by 2050
- Water supplies from glaciers & snow cover will decline
- Drought-prone areas likely to expand
 - Africa: 'water stress' likely to affect 75-250 million by 2020
 - Asia: >1 billion may be adversely affected by 2050s
- Increased storminess likely to increase flood risk
- Sea-level rise will increase saltwater contamination of groundwater

Water availability

By 2050s – in high latitudes & some wet tropical areas, average water availability will increase by 10-40%; in some dry regions at mid-latitudes and dry tropics, average water availability will decrease by 10-30%

Meltwater-fed areas

Currently 1/6 of world population live in these areas

All data from IPCC (2007c)

Coastal areas

- Sea-level rise will lead to major increase in flooding risk and loss of land
- Huge numbers affected
 - Currently, half world population lives in coastal areas
- Mega-deltas of Asia and Africa, and small island states, will be most affected
 - Eastern China: 30 million currently live in areas under threat
 - Bangladesh: 15 million...
 - Egypt: 7 million...
 - Small island states: ½ million affected

Sea-level rise 18-59cm by 2100 (IPCC, 2007a) – but as these projections do not include all known feedbacks, including ice sheet melting, this rise is likely to be underestimate

China: sea level rise of 0.5m would inundate 40,000km² on eastern coast where 30 million people currently live

Bangladesh: sea level rise of 1m (majority due to land subsidence) would flood area where 15 million people currently live

Egypt: sea level rise of 1m (majority due to land subsidence) would flood area where 7 million people currently live

Small island states: whole land area almost entirely below 3m – but inundation of land, increased flood risk and groundwater salination likely to make them uninhabitable well before reaching that level

Source for country estimates: Houghton (2004), pp150-155

Food supplies

- Potential for major disruption in food supplies
- Crop productivity likely to fall in tropics & sub-tropics
 - access to food is projected to be “severely compromised” in many African countries
- Crop productivity across the globe will also change
 - *increase* for modest temperature rise
 - *decrease* for large temperature rise
- Adverse effects on fisheries

Impacts will combine with existing problems of soil erosion & water shortages

From IPCC (2007c)

Human health

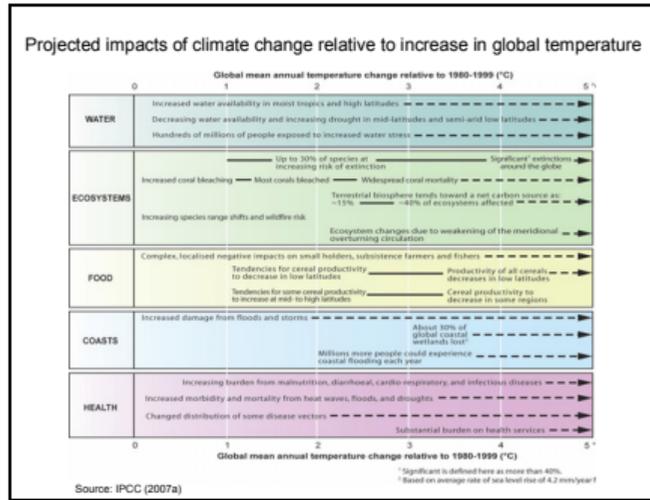
- Health of millions of people adversely affected, due to increases in:
 - malnutrition
 - damage and disease related to extreme weather
 - diarrhoeal disease
 - cardio-respiratory disease (due to ozone)
 - many infectious diseases
- But...
 - cold-related deaths likely to fall

From IPCC (2007c)

Ecosystems

- Potentially large-scale extinction
 - 20-30% of plant & animal species at increased risk of extinction if global temperature rises by 1.5-2.5 C above 1990 level
- Forests start to emit CO₂
 - carbon uptake by forests & other ecosystems will start to fall, and may begin to reverse
- Ocean acidification
 - serious damage to shelled animals
- Corals, tropical forests & mangrove swamps especially vulnerable

From IPCC (2007c)



'Dangerous' climate change

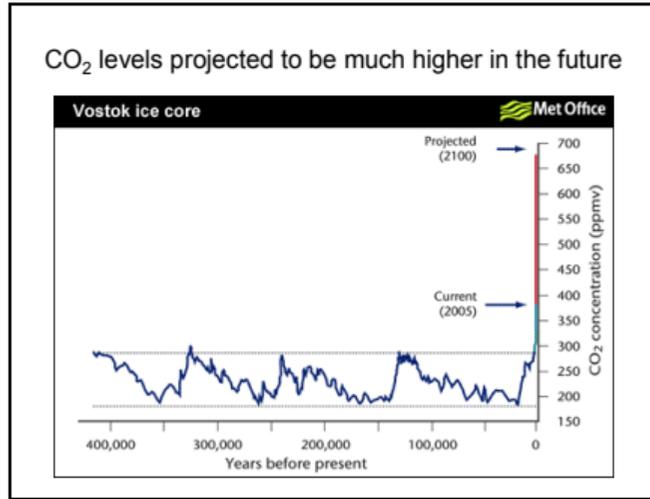
- Main aim of Climate Change Convention
 - 'to prevent dangerous anthropogenic interference with the climate system'
- Many argue for threshold at 2°C above pre-industrial level
- Large potential for irreversible effects if global temperature remains above this level (e.g.)
 - Melting of major ice sheets
 - Die-back of Amazon rainforest
 - Release of 'frozen methane'
 - Major weakening of ocean currents (e.g. Gulf Stream)

2°C threshold – first political agreement by European Union in 1996

E.g. Greenland ice sheet - if global temperature rises to between 1.9°C and 4.6°C above the pre-industrial level, and remains there, then the ice sheet will eventually disappear completely leading to a sea level rise of 7m (though this may take millennia to complete)

Sources: Pearce (2005), IPCC (2007a)

CO₂ levels projected to be much higher in the future



Data from Petit et al (1999) and IPCC

Impacts: general point

- Impacts felt most heavily by poor communities who are:
 - already the most vulnerable
 - least responsible for causing the problem

24

Potential for military conflict

'Indirect' climate impacts

- Environmental refugees
 - main causes:
 - loss of land (inundation & flooding)
 - disruption of food supplies
 - estimated ~150 million by 2050
- Economic disruption, recessions and (eventually) depression
- Political instability

Environmental refugees estimate from Houghton (2004), p187

Climate change compounds other problems

- **Poverty**
 - 1 billion currently in extreme poverty
- **Population growth**
 - Global population projected to grow to 9.2 billion by 2050
- **Resource depletion**
 - Groundwater, minerals etc rapidly being depleted
 - 'Peak oil' approaching
- **Biodiversity loss**
 - Forests, fisheries being rapidly depleted
 - On the verge of a 'mass extinction event'
- **Infectious diseases**
 - Currently 40 million people living with AIDS
- and others...

Figures from: UN (2007), UNFPA (2008)

Existing wars and weapons stocks

- Current military conflicts
 - 28 wars and 15 other 'armed conflicts' in 2006
 - Most in Asia, Africa and Middle East
- Global nuclear weapons stockpiles
 - ~25,500 warheads
 - 1 in 10 warheads on 'high-alert'
- 'Small arms'
 - Hundreds of millions in circulation

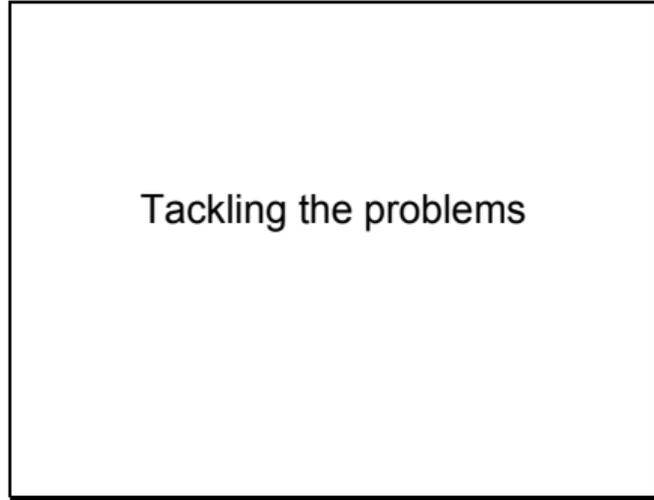
Figures on current military conflicts from Renner (2008).
Figures on nuclear weapons stocks from Federation of American Scientists (2008) and Starr (2008).

Potential for further military conflict

- In countries which are already unstable
 - Recent history of conflict
 - Weak institutions
- Related to increasingly scarce resources
 - Fresh water supplies
 - Food supplies
 - Land
- International Alert estimates **more than half of the world is 'at risk'**
 - 46 countries at high risk of violent conflict
 - 56 countries at high risk of political instability

From International Alert (2008).

29



The need for global action

- Control/ reduction of emissions needed to prevent 'dangerous' effects
 - Global GHG emissions need to start falling in next 5-10 years and reduce by at least 50% by 2050
- Adaptation
 - Time lags mean some future climate change is inevitable
 - So need e.g. coastal defences, 'natural' disaster preparedness

To keep below 2.0-2.4 C above pre-industrial levels, global emissions need to peak between 2000-2015 and reduce by 50%-85% by 2050 (IPCC, 2007a)

Contrasting approaches

- 'Techno-fix' approach
- 'Sustainable security' approach

Author's definitions

Techno-fix: technologies

- Complex technologies relied on as the main solutions
- Tackling climate change
 - Nuclear power, fossil fuels using carbon capture and storage, geo-engineering
- Security
 - High technology military, e.g. 'smart' missiles, robots, space weapons
- Food
 - Expansion of industrial farming, GM crops

Techno-fix: policies

- Reliance on globalised free trade for deployment of technologies and distribution of resources
- Continued pursuit of unending economic growth
- Little restriction of lifestyle choices

Techno-fix: pitfalls

- Failure to properly recognise:
 - Environmental resource limits
 - Inability to achieve 'military victory'
 - Persistence of global inequality
 - Security risks of long supply chains
 - 'Side effects' of complex technologies, e.g.
 - Weapons proliferation risks of nuclear power
 - Soil erosion and water pollution caused by industrial farming

Sustainable security: technologies

- Emphasis on **efficient** use of **renewable** resources and more localised supply chains
- Tackling climate change
 - Energy efficiency (e.g. insulation), renewable energy (e.g. wind, solar, water), public transport
- Security
 - Strategies led by focus on conflict prevention
 - Technology used to improve infrastructure and support verification of disarmament treaties
- Food supply
 - Low-input agriculture (e.g. organic)

Sustainable security: policies

- Encouragement of lifestyle change among communities with high emissions
 - e.g. through ecological tax reform
- Development assistance
 - To strengthen institutions and infrastructure
 - To assist adaptation programmes
- 'Disarmament for development'
 - Focus on diplomacy & treaties to deal with conflict
 - Diversion of resources from military to social & environmental programmes

Sustainable security: advantages

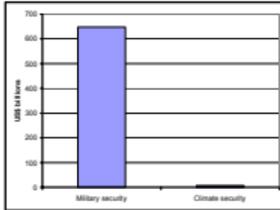
- Builds resilience of communities and countries to a range of threats
- Solutions to different problems often similar
 - E.g. phasing out fossil fuels tackles climate change, energy security and conflict in the Middle East
- Deals with uncertainty

Where are we?

- Large resources devoted to the 'techno-fix' approach
- Some resources spent on 'sustainable security' approach
- Time is rapidly running out to make the change...

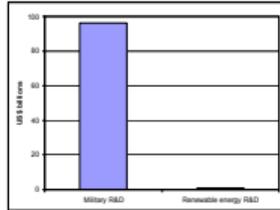
Military spending v climate spending

US Federal spending (FY 2008)



Source: Pemberton (2008)

Government R&D spending in OECD countries (2006)



Source: SGR (2008)

Skilled workers are key; often these are in even shorter supply than money

Climate change needs to be tackled...

- *“with a sense of urgency and shared resolve that has previously been seen only when nations have mobilized for war.”*

Al Gore, acceptance speech
2007 Nobel Peace Prize

Roles for peace campaigners

- Highlighting the huge imbalance between military and climate spending
- Highlighting the potential for military conflict resulting from climate change
 - But care needed!
- Arguing for sustainable security approach supported by a major shift in spending
- Target environmental campaigners!

A few glimmers of hope

- Growing recognition of the major potential of green economy
- UK Climate Change Bill
- UK National Security Strategy
- President Obama

References

- DESC (2006). Factbook FY 2005 (28th edition). Defense Energy Support Center, USA.
<http://www.desc.dla.mil/DCM/Files/Fact05Revised.pdf>
- Federation of American Scientists (2008). Status of World Nuclear Forces 2008.
<http://www.fas.org/programs/ssp/nukes/nukestatus.html>
- Pemberton M (2008). The budgets compared: military vs climate security. Institute for Policy Studies.
<http://www.ips-dc.org/reports/#83>
- Houghton J (2004) Global Warming: the complete briefing. Cambridge University Press.
- IPCC (2007a). Climate Change 2007: Synthesis Report. (Summary for Policymakers.) Intergovernmental Panel on Climate Change. http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf
- IPCC (2007b). Climate Change 2007: The physical science basis. (Summary for policy-makers.) Working Group I of the Intergovernmental Panel on Climate Change.
<http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>
- IPCC (2007c). Climate Change 2007: Impacts, adaptation and vulnerability. (Summary for policy-markers.) Working Group II of the Intergovernmental Panel on Climate Change.
<http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf>
- IPCC (2007d). Frequently Asked Questions. Working Group I of the Intergovernmental Panel on Climate Change. http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Pub_FAQs.pdf
- MoD (2006). Sustainable Development Annual Report 2005. Ministry of Defence, UK.
<http://www.mod.uk/DefenceInternet/AboutDefence/WhatWeDo/HealthandSafety/DSC/SustainableDevelopmentAnnualReport2005.htm>
- Pearce F. (2005). Climate Change: Awaking the sleeping giants. *New Scientist*, 12 February, p9-11.
<http://environment.newscientist.com/article/mg18524864.400.html>
- Petit J.R., Jouzel J., Raynaud D., Barkov N.I., Barnola J.M., Basile I., Bender M., Chappellaz J., Davis J. Delaygue G., Delmotte M. Kotlyakov V.M., Legrand M., Lipenkov V.M., Lorius C., Pépin L., Ritz C., Saltzman E., Stievenard M. (1999). Climate and Atmospheric History of the past 420,000 years from the Vostok Ice Core, Antarctica. *Nature*, Vol 399, No 6735, pp429-436 (3 June).
- Reisch N & Kretzmann S (2008). A Climate of War: The war in Iraq and global warming. (Advance edition, March.) Oil Change International. <http://priceofoil.org/climateofwar/>
- Renner M (2008). Number of Violent Conflicts Steady. *Worldwatch* Institute.
<http://www.worldwatch.org/node/5465>
- International Alert (2008). Press release, 29 April. <http://www.international-alert.org/press/archive.php?id=240>
- Starr S (2008). High-alert nuclear weapons: the forgotten danger. *SGR Newsletter*, No. 36 (summer).
http://www.sgr.org.uk/newsletters/NL36_lead.pdf
- SGR (2008). Behind Closed Doors: Military influence, commercial pressures and the compromised university. *Scientists for Global Responsibility*.
<http://www.sgr.org.uk/ArmsControl/MilitaryInfluence.html>
- UN (2007). The Millennium Development Goals Report. United Nations, New York.
<http://www.un.org/millenniumgoals/>
- UNFPA (2008). State of World Population 2008. <http://www.unfpa.org/swp/>
- World Health Organisation (2003). Climate Change and Human Health – risks and responses. WHO Press.
<http://www.who.int/bookorders/anglais/detart1.jsp?sesslan=1&codlan=1&codcol=15&codcch=551>