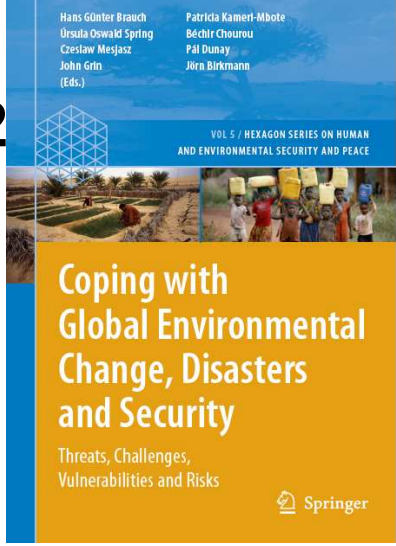
Chulalongkorn University

Bangkok, Thailand
Wednesday, 12 December 2012, 9-12



Lecture to MAIDS

Coping with Global Environmental Change in the Anthropocene

Hans Günter Brauch

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Adj. Prof. Free University of Berlin
Fellow, United Nations University, Institute on Environment & Human Security, Bonn (UNU-EHS)

Hexagon Series on Human, Environmental Security and Peace, vol. 8
Springer Briefs in Environment, Security, Development & Peace, vol. 1-2
SpringerBriefs on Pioneers in Science & Practice, vol. 1

Springer
the language of science

AFES-PRESS

Pioneers
Science
Practice

Reading Texts

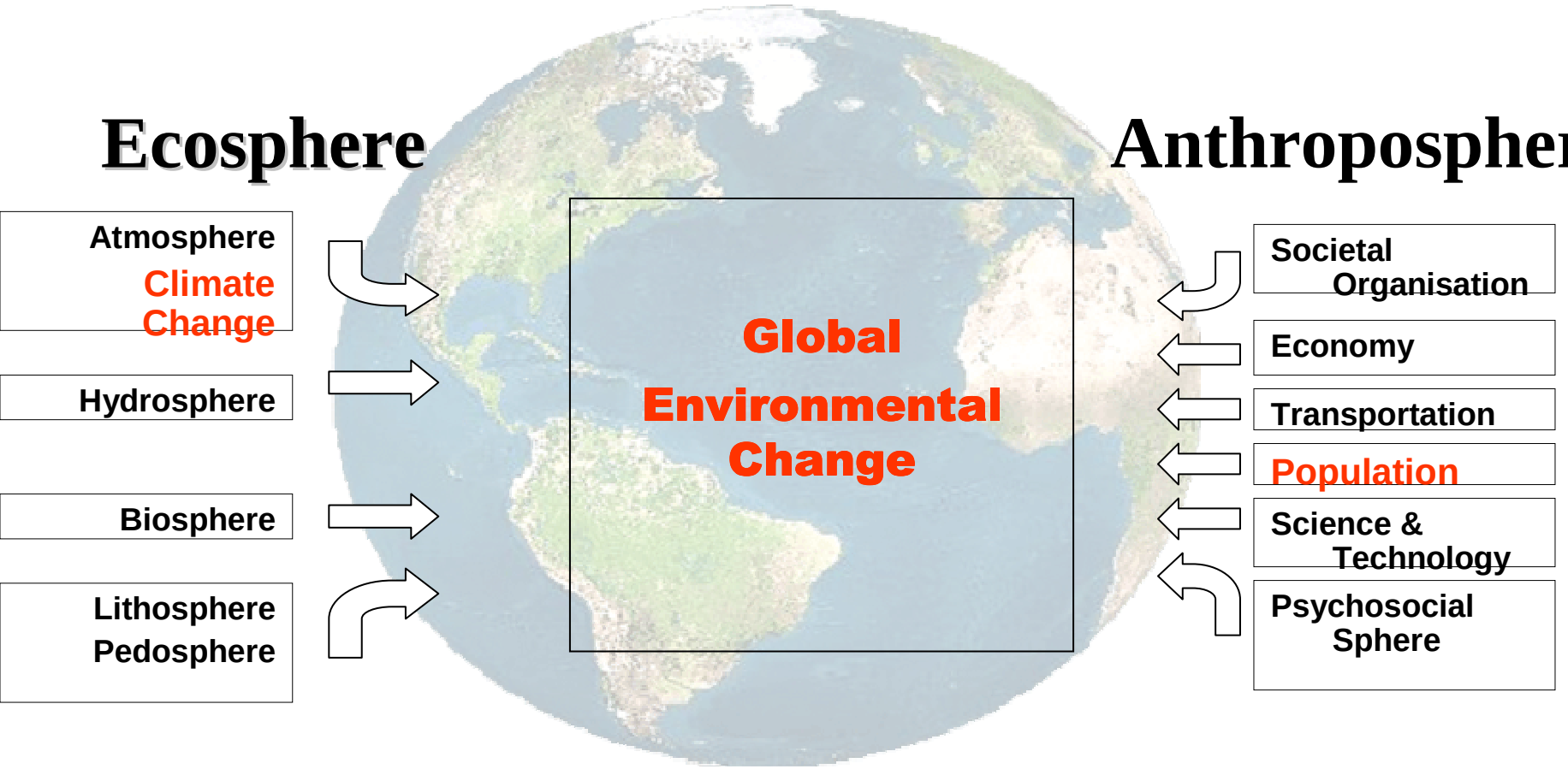
- Text 1: Brauch, Hans Günter; Oswald Spring, Úrsula, 2011: “Introduction: Coping with Global Environmental Change in the Anthropocene”, in: Brauch, Hans Günter; Oswald Spring, Úrsula; Mesjasz, Czeslaw; Grin, John; Kameri-Mbote, Patricia; Chourou, Béchir; Dunay, Pal; Birkmann, Jörn (Eds.), 2011: Coping with Global Environmental Change, Disasters and Security – Threats, Challenges, Vulnerabilities and Risks (Berlin – Heidelberg – New York: Springer-Verlag): 31-60.
- Text 2: Oswald Spring, Úrsula; Brauch, Hans Günter, 2011: “Coping with Global Environmental Change – Sustainability Revolution and Sustainable Peace”, in: Brauch, Hans Günter; Oswald Spring, Úrsula; Mesjasz, Czeslaw; Grin, John; Kameri-Mbote, Patricia; Chourou, Béchir; Dunay, Pal; Birkmann, Jörn, 2010: Coping with Global Environmental Change, Disasters and Security – Threats, Challenges, Vulnerabilities and Risks (Berlin – Heidelberg – New York: Springer-Verlag): 1487-1504.

Contents

1. Introduction: Two Discourses & Research Questions

- Objectively Global Environmental Change (GEC) & Climate Change has been a challenge for humankind since eternity
- Since the 1970s Global Environmental Change & Climate Change is perceived as a **scientific problem (scientization)**
- GEC was discussed as policy issue since 1988 (**politicization**)
- Since 2007 it was addressed in the UN‘s security council (2007, 2011), UN General Assembly (2009) and in report of Secretary General on **CC & Security** of 11 Sept. 2009 (**securitization)**
- This report referred to two discourses CC as a **threat maximizer** (security) & **threat minimizer** (sustainable development)
- This talk will review both discourses and review the global policy and scientific debates on CC and international, national & human security (IPCC, 5th Assessment Report, II, 12 (2014)

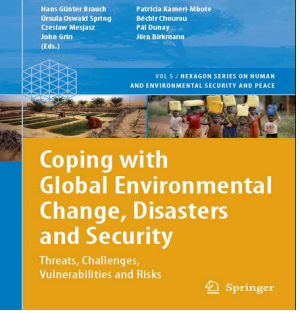
1.1. Global Environmental and Climate Change: Rio Conventions UNFCCC (1992) & Kyoto Protocol (1997)



GEC poses a threat, challenge, vulnerabilities and risks for human security and survival.

1.2. Major achievements

- **UNCED or first Earth Summit in Rio in June 1992**
  - 1972: Stockholm put environment on UN agenda, UNEP
  - 1987: Brundtland Commission: sustainable development
  - 1992: UNCED launched global environment governance with three major global environment regimes
- **UNFCCC (1992): Process of Conference of Parties**
  - COP 1 (1995): Berlin Mandate for a Protocol
  - **COP 3 (1997): Kyoto Protocol**, with QELROs for Annex B countries (OECD and former Comecon countries of -5% by 2012)
  - COP 15 (2009): Copenhagen failure to agree on Post KP-Regime
  - COP 16 (2010): Cancun Accords: voluntary commitments
  - COP 17 (2011): Durban: Nonbinding goal for new regime by 2020
- **UNCBD**
  - **Cartagena Protocol on Biosafety (2000, entered into force 2003)**
  - **Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (2010, not yet in force)**
- **UNCCD: no legally binding protocol so far.**

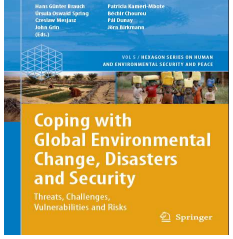


1.3 Reconceptualization of Security

- **Security concept has been reconceptualised and security interests & goals were redefined globally since 1990 due to**
  - end of the Cold War in 1989 with fall of the Berlin Wall,
  - the process of globalization and its impacts (9/11, fin. crisis)

Reunification of Germany
Enlargement of the EU
9/11/2011: 2752 people died: „war on terror“ ➔

29 August 2005: **Hurricane Katrina:** 1838 deaths (official)
Securitization of 9/11 and nonsecuritization of GEC & climate change impacts

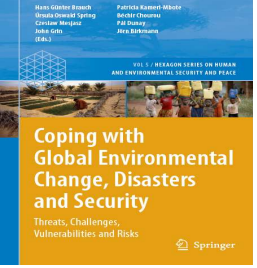


1.4. Changing Security Concepts

This reconceptualization of Security has resulted in a

- ***widening*** from the narrow military and political dimensions to economic, societal and environmental dimensions;
- ***deepening*** from the 'state-centred' to 'human centred' concepts of human security both upward from national to regional, international and global security and downward to community and people's or human security;
- ***sectorialization*** to energy, food, water, health, soil, livelihood, climate and other security concepts that have been used by international organizations and scientists to upgrade the urgency of their respective activities or fields.

Security dimension⇒ ⇓ Level of interaction	Mili-tary	Political	Economic	Environ-mental ⇓	Societal
Human individual ⇒			Food sec. Health sec.	Cause & Victim	Food sec. Health sec.
Societal/Community				⇓⇑	
National	shrinking		**Energy se.**	⇓⇑	Food,health
International Regional			**Water security**	⇓⇑	**Water security**
Global/Planetary ⇒				**GEC**	



1.5. Environmental & Human Security

Label	Reference object	Value at risk	Source(s) of threat
National security	The State	Territ. integrity	State, sub-state actors
Human security	Individual, humankind	Survival	Nature, state, globalization
Environmen-tal security	Ecosystem	Sustainabilit y	Humankind

Canadian and British contributions:

Human security: **Canada: founding member of Human Security Network, tabled „human security“ & responsibility to protect to UNSC (Axworthy)**

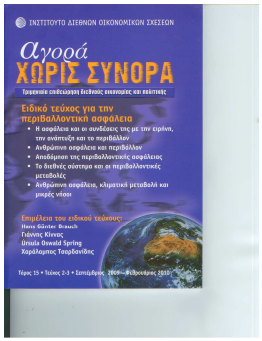
Environmental security: **Toronto Group, Th. Homer-Dixon (1991-2000)**

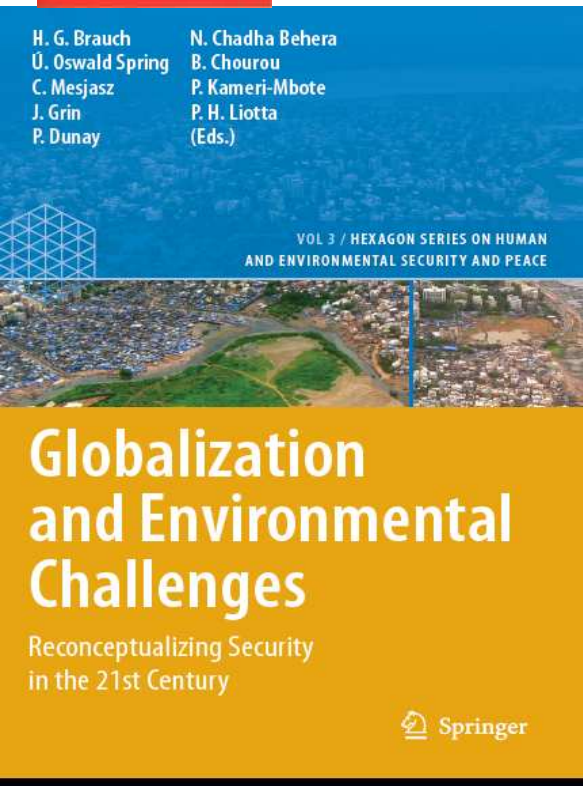
work of Simon Dalby (eco-geopolitics and political geoecology)

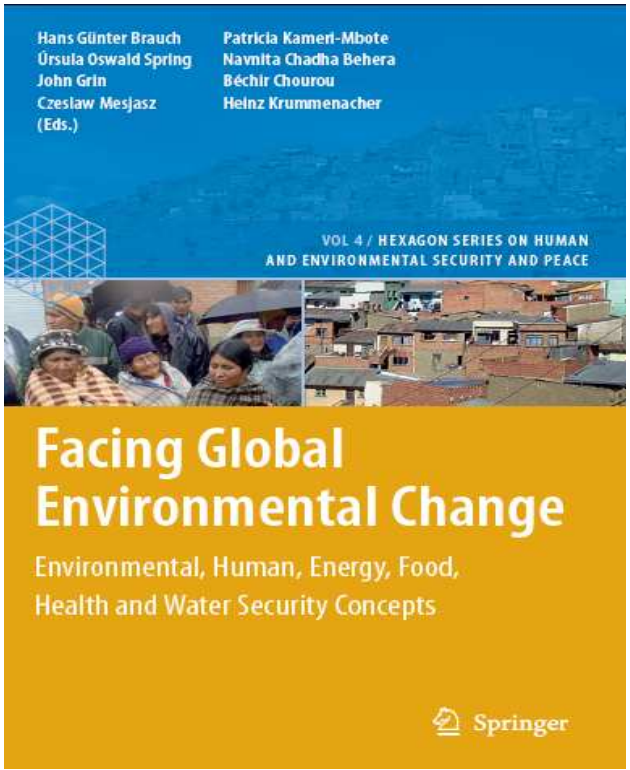
Climate Security: UK, M. Beckett, 17.4.2007: tabled climate change to UNSC

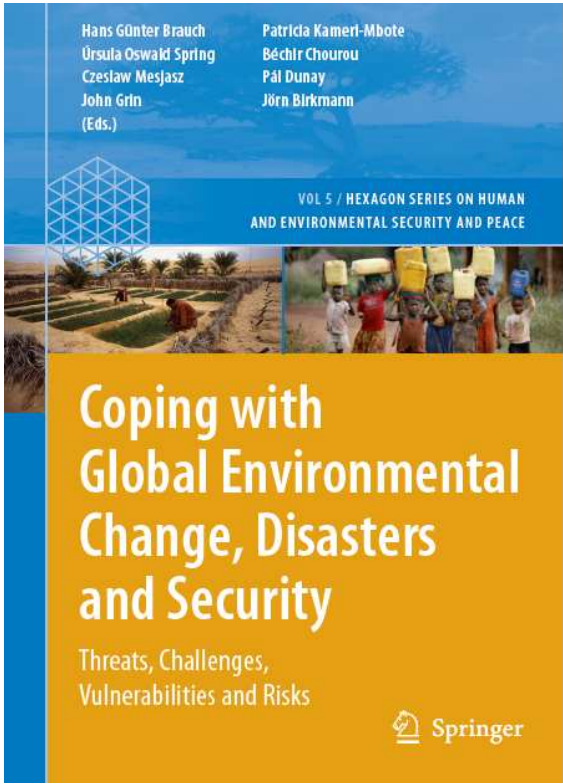
1.6. Global Environmental & Human Security Handbook for the Anthropocene (GEHSHA)

Vol. 3 (1): Globalization and Environmental Challenges: 92 authors, 36 countries, 16 disciplines, (2008)
Vol. 4 (2): Facing Global Environmental Change: 132 authors, 49 countries on global debate and problems of environmental, human, energy, food, health, water security (2009)
➔**Vol. 5 (3): Coping with Global Environmental Change:** ***Disasters and Security – Threats, Challenges, Vulnerabilities and Risks*** **164 authors, 48 countries (2011).** ➘

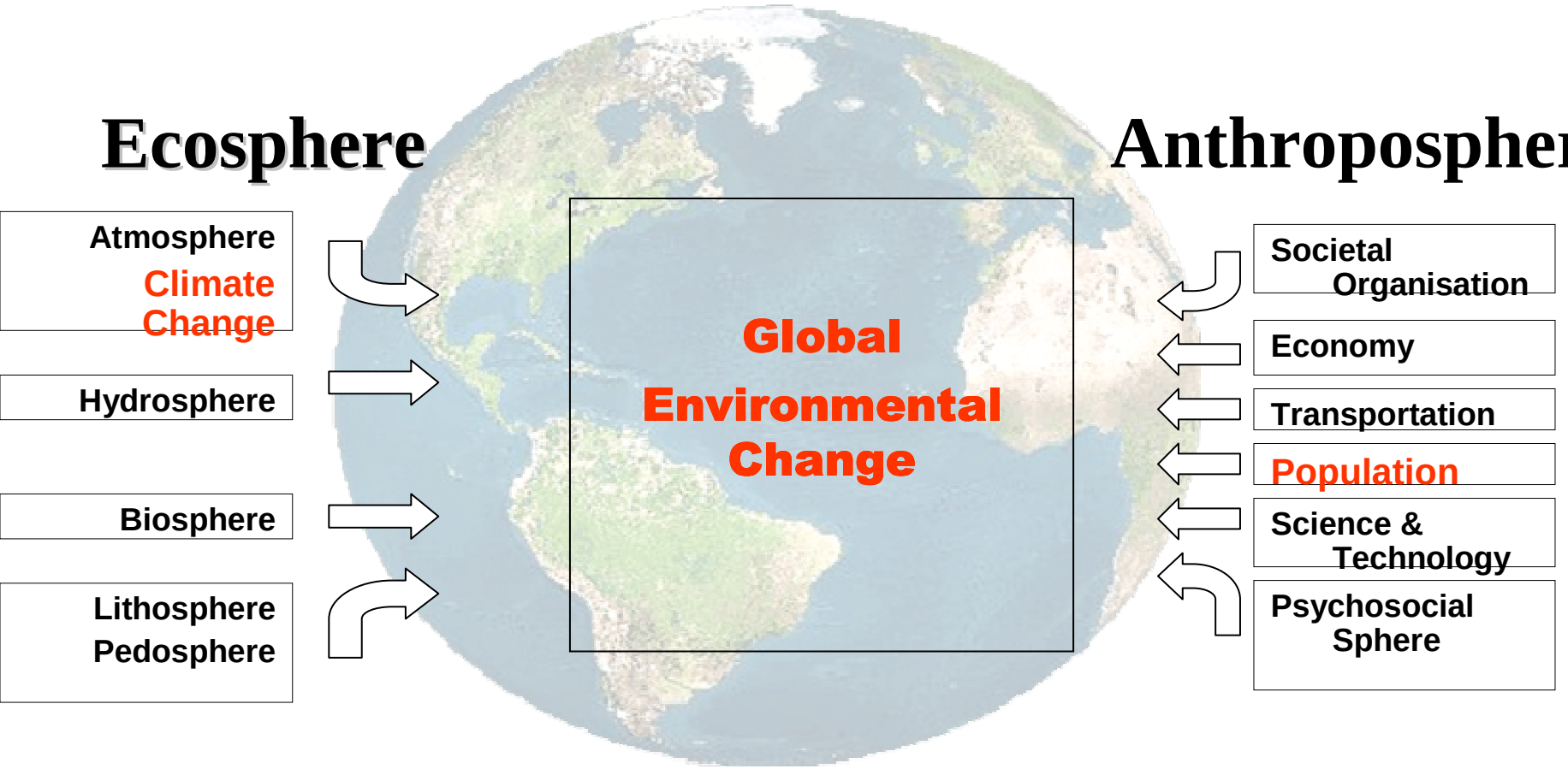








2. Global Environmental and Climate Change: Rio Conventions UNFCCC (1992) & Kyoto Protocol (1997)

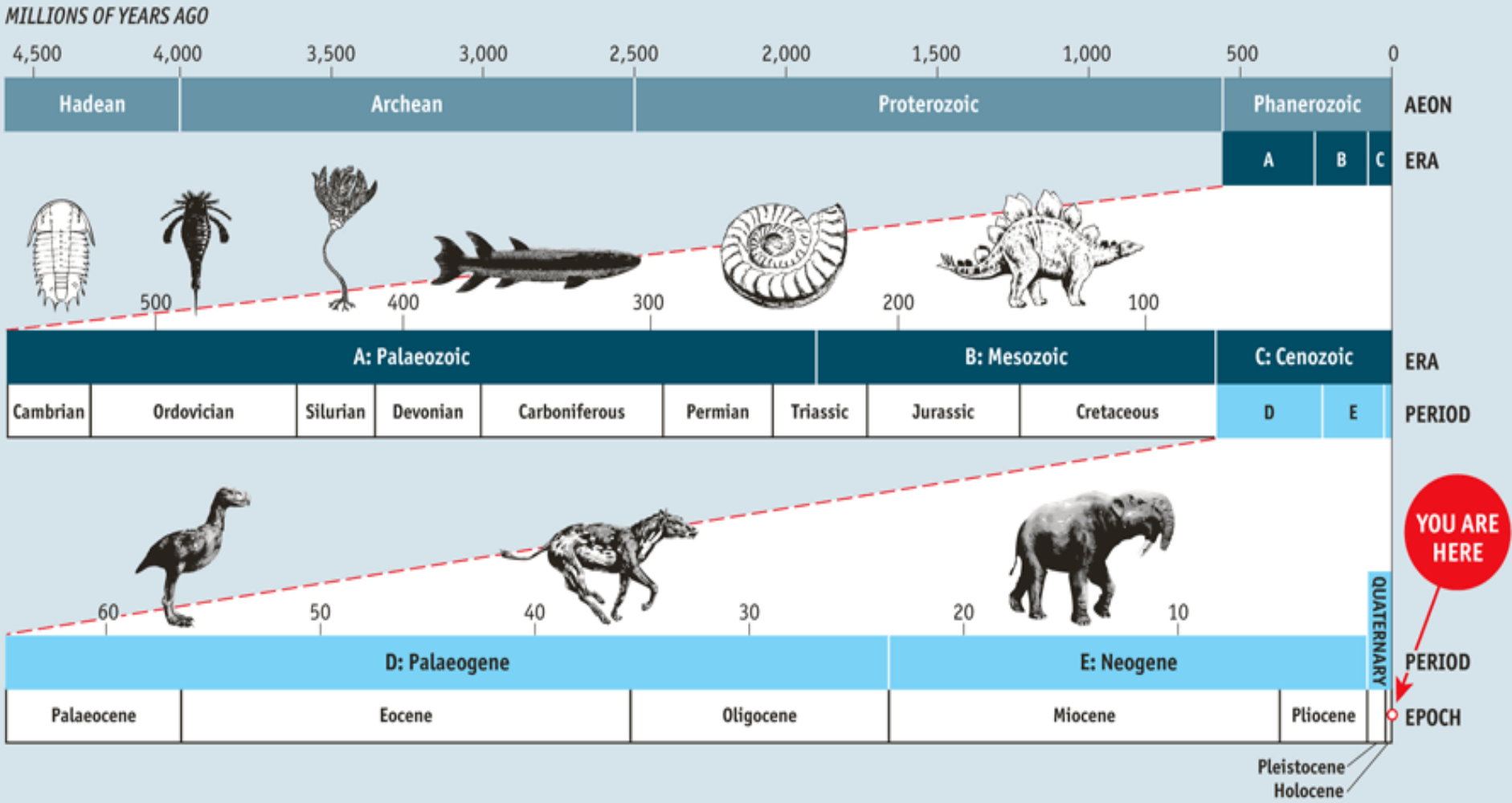


GEC poses a threat, challenge, vulnerabilities and risks for human security and survival.

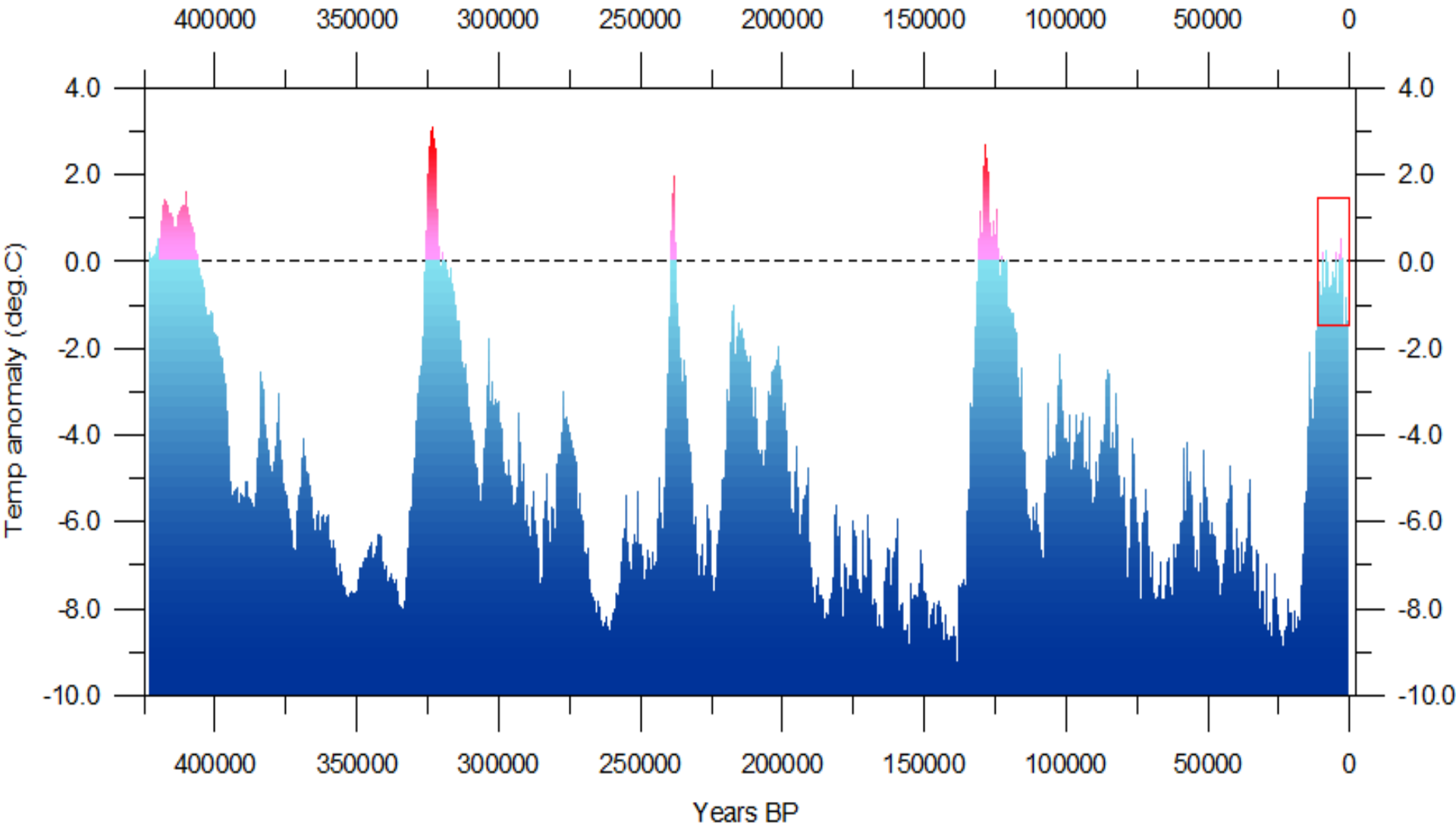
2.1 Transition of Earth History: From the Holocene to the Anthropocene

- We have mapped a fundamental and global **Reconceptua-lization of Security** since 1989 for three reasons:
- What has triggered this global contextual & conceptual change?
  - End of the Cold Wat
  - Process of Globalization
  - Global environmental change: Transition from Holocene to Anthropocene
- Which conceptual innovations affecting the security analysis
  - Ulrich Beck (1986, 2007): Theory of (international) risk society
  - Ole Wæver (1997): Theory of securitization (Copenhagen school of critical security studies
  - Paul J. Crutzen (2000): Humankind was instrumental for transition in earth history from Holocence (12000 BP) to Anthropocene

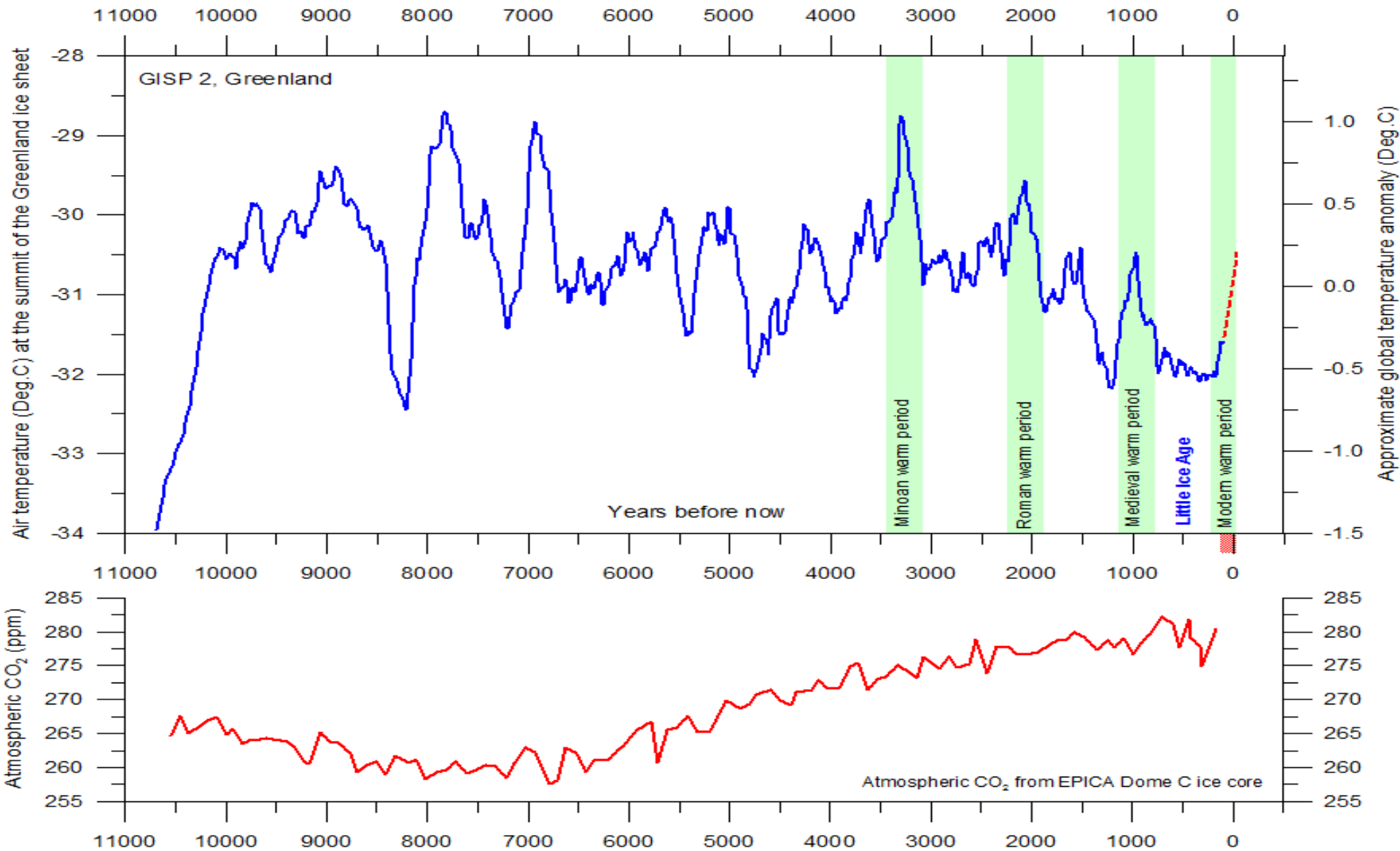
2.2 Geological Time: Earth History



2.3 Geological times: 400 000 years of climate history

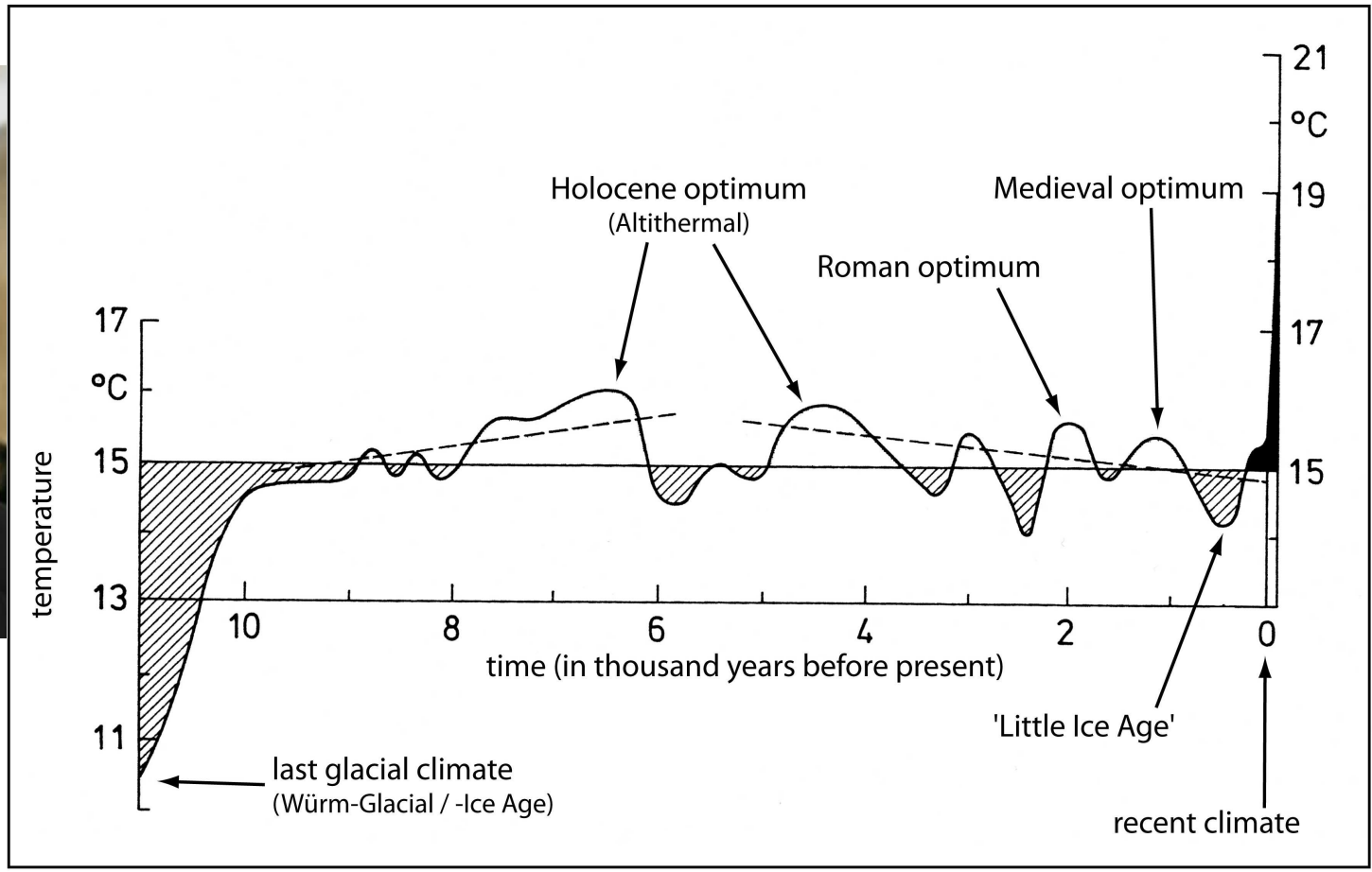


2.4. The Holocene (11600 BP-now)



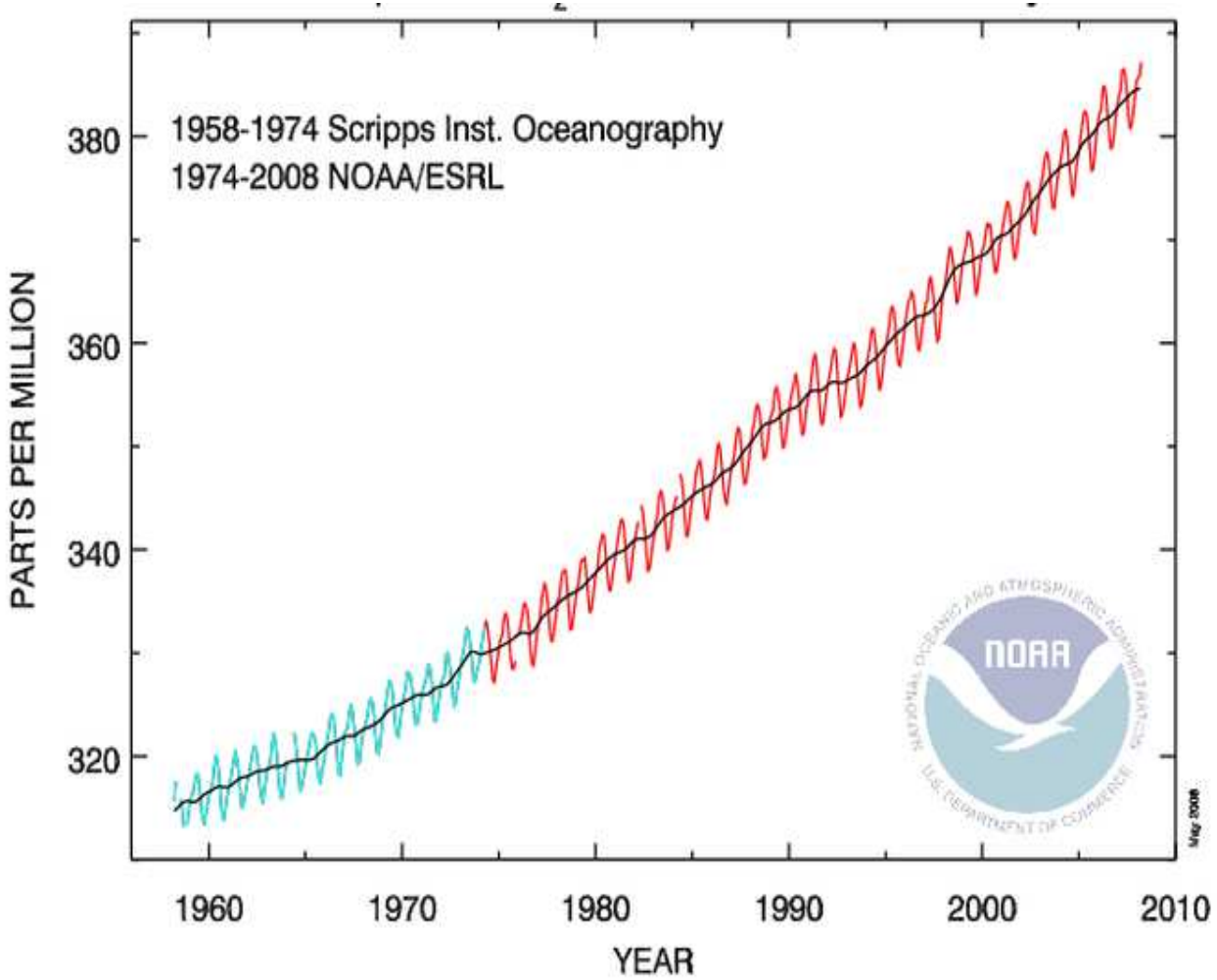
2.5. From the Holocene (12.000 years b.p.) to the Anthropocene (1784 AD)

Paul Crutzen, Nobel Laureate for Chemistry (1995)



In Geology/geography: **Holocene** era of earth history since end of glacial period (10-12.000 years ago, Anthropocene, since industrial revolution (1784, J.Watt's invention of steam engine: anthropogenic climate changte: burning of coal.oil,gas➔GHG increase

2.6. Anthropogenic Climate Change in the Anthropocene Era (1750 to present)



- GHG concentration in the atmosphere
- 1750: 279 ppm, 1987: 387 ppm
- 2011: 393 ppm
- 2012: 396 ppm
- 1/3: 1750-1958: 279 to 315 ppm
- 2/3: 1958-2011: 315 to 393 ppm

3. Global Climate Change: Temperature Increases & Sea Level Rise

Climate Change Impacts: Temperature & Sea level Rise

- Global average temperature rise in 20th century: + 0.6°C

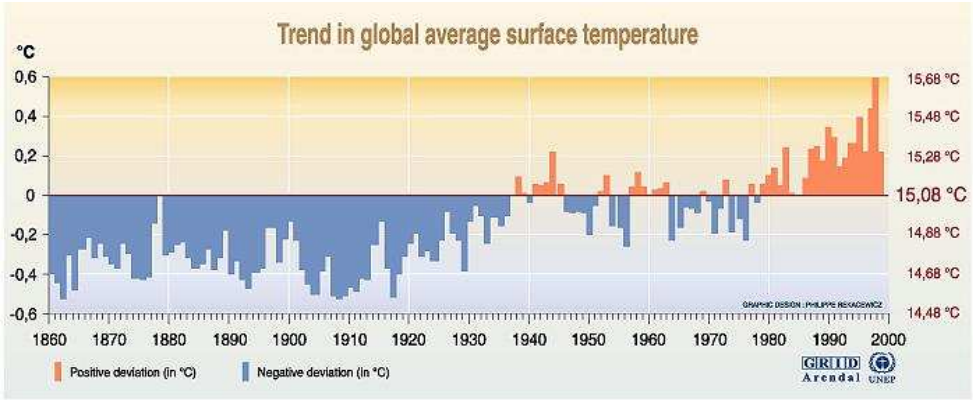
Projected temperature rise:

- TAR (1990-2100):+1.4-5. 8°C
- AR4 (07):+1.1-6.4 (1.8-4)°C

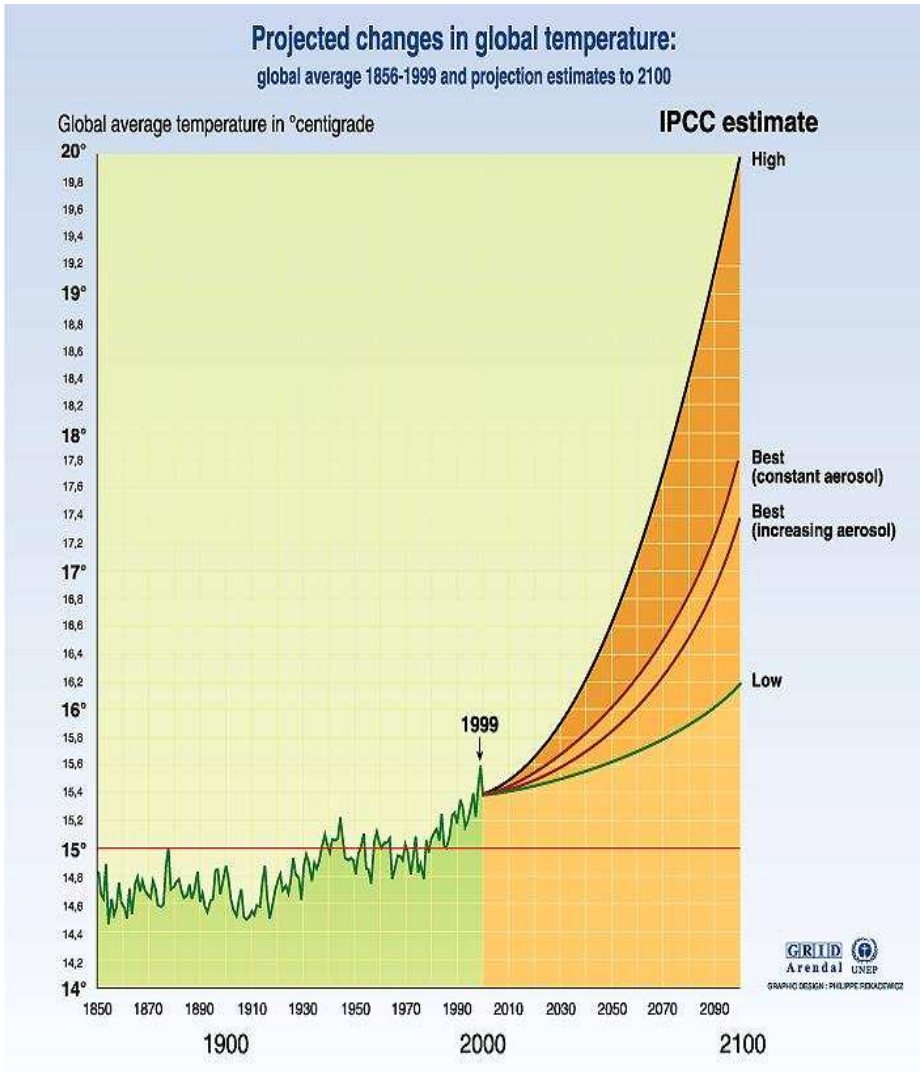
Sources: IPCC 1990,1995,2001,'07

Sea level Rise:

- 20th cent.: +0,1-0,2 metres
- TAR: 21st century: 9-88 cm
- AR4 (2000-2100): 18-59 cm

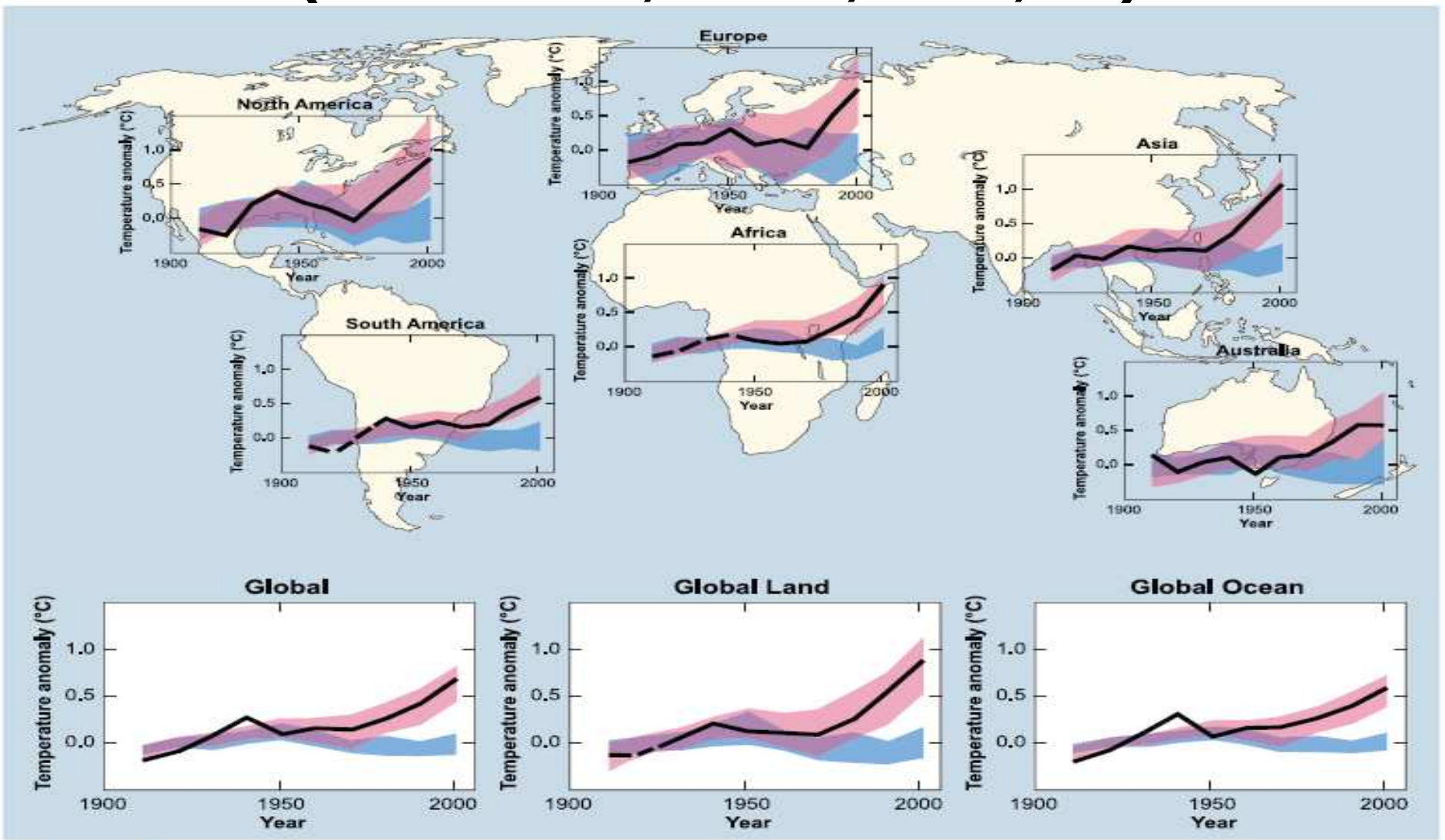


Source: School of environmental sciences, climatic research unit, university of East Anglia, Norwich, United Kingdom, 1999.



Source : Temperatures 1856 - 1999: Climatic Research Unit, University at East Anglia, Norwich UK. Projections: IPCC report 95.

3.1. Global & Regional Change in Temperature (IPCC 2007, WG 1, AR4, 11)



3.2. Average Value of Surface Temperature (IPCC 2007, WG 1, AR4, p. 14)

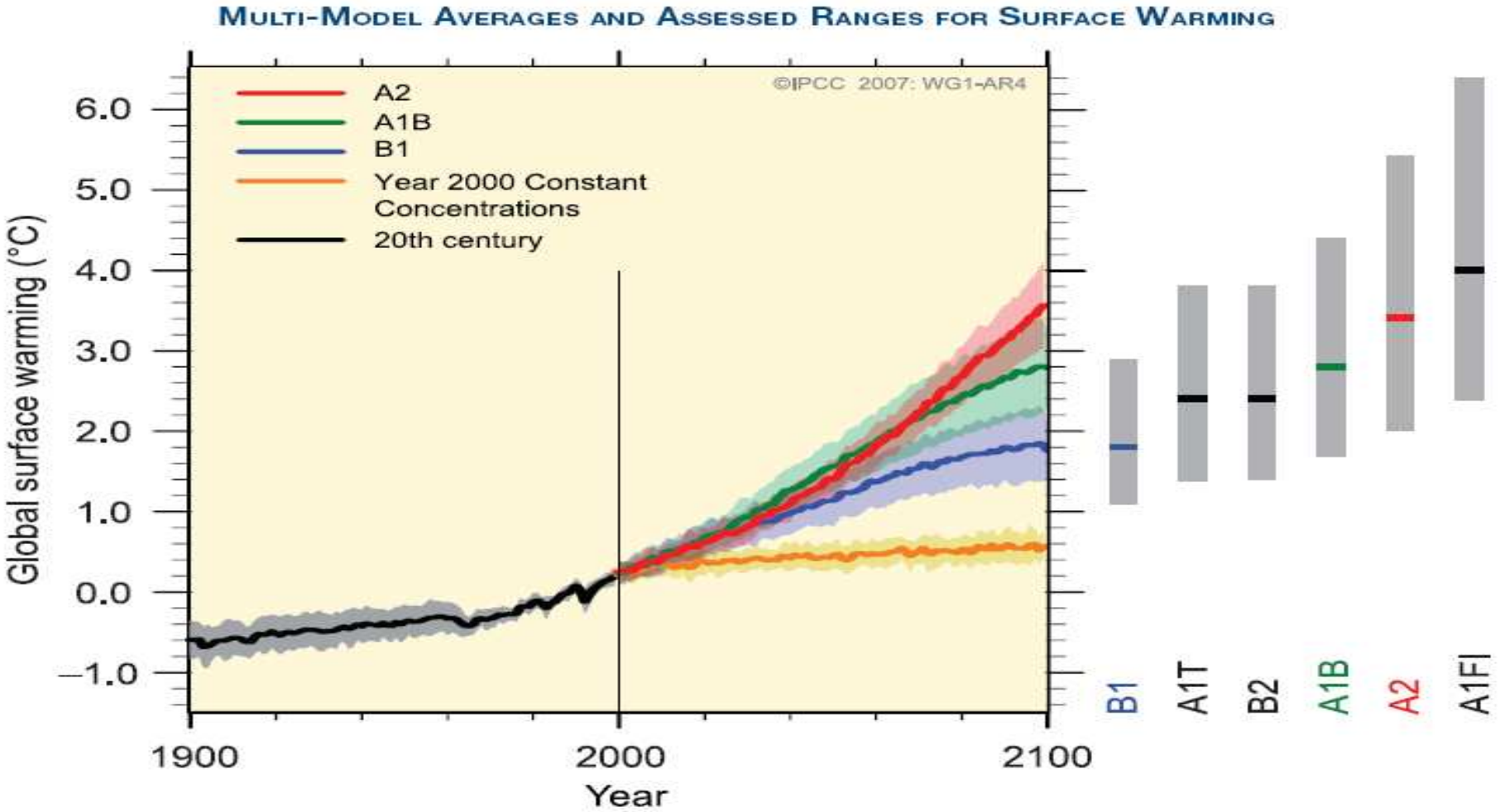
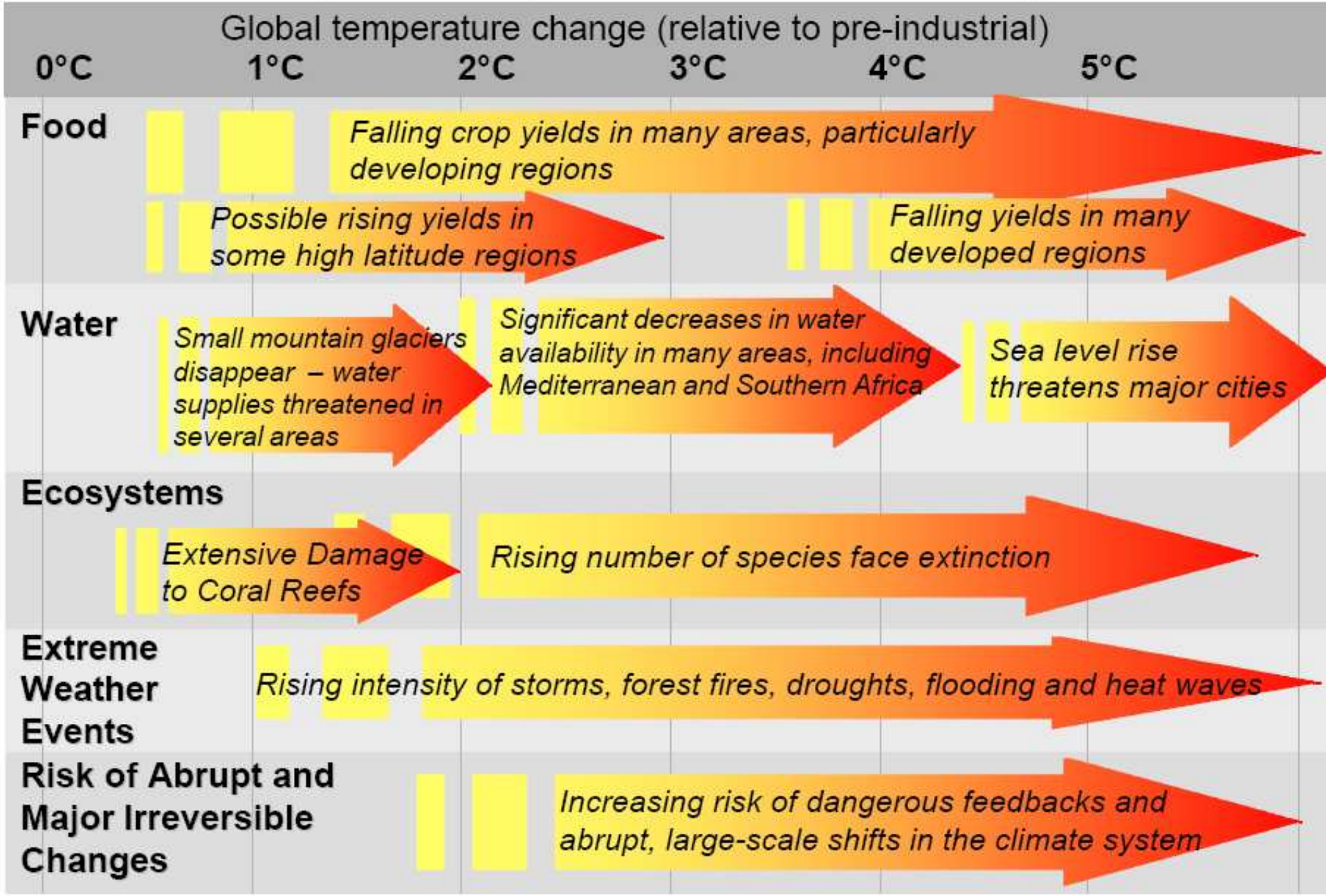


Figure SPM.5. *Solid lines are multi-model global averages of surface warming (relative to 1980–1999) for the scenarios A2, A1B and B1, shown as continuations of the 20th century simulations. Shading denotes the ±1 standard deviation range of individual model annual averages. The orange line is for the experiment where concentrations were held constant at year 2000 values. The grey bars at right indicate the best estimate (solid line within each bar) and the* ***likely*** *range assessed for the six SRES marker scenarios. The assessment of the best estimate and* ***likely*** *ranges in the grey bars includes the AOGCMs in the left part of the figure, as well as results from a hierarchy of independent models and observational constraints. {Figures 10.4 and 10.29}*

Projected Impacts of Climate Change

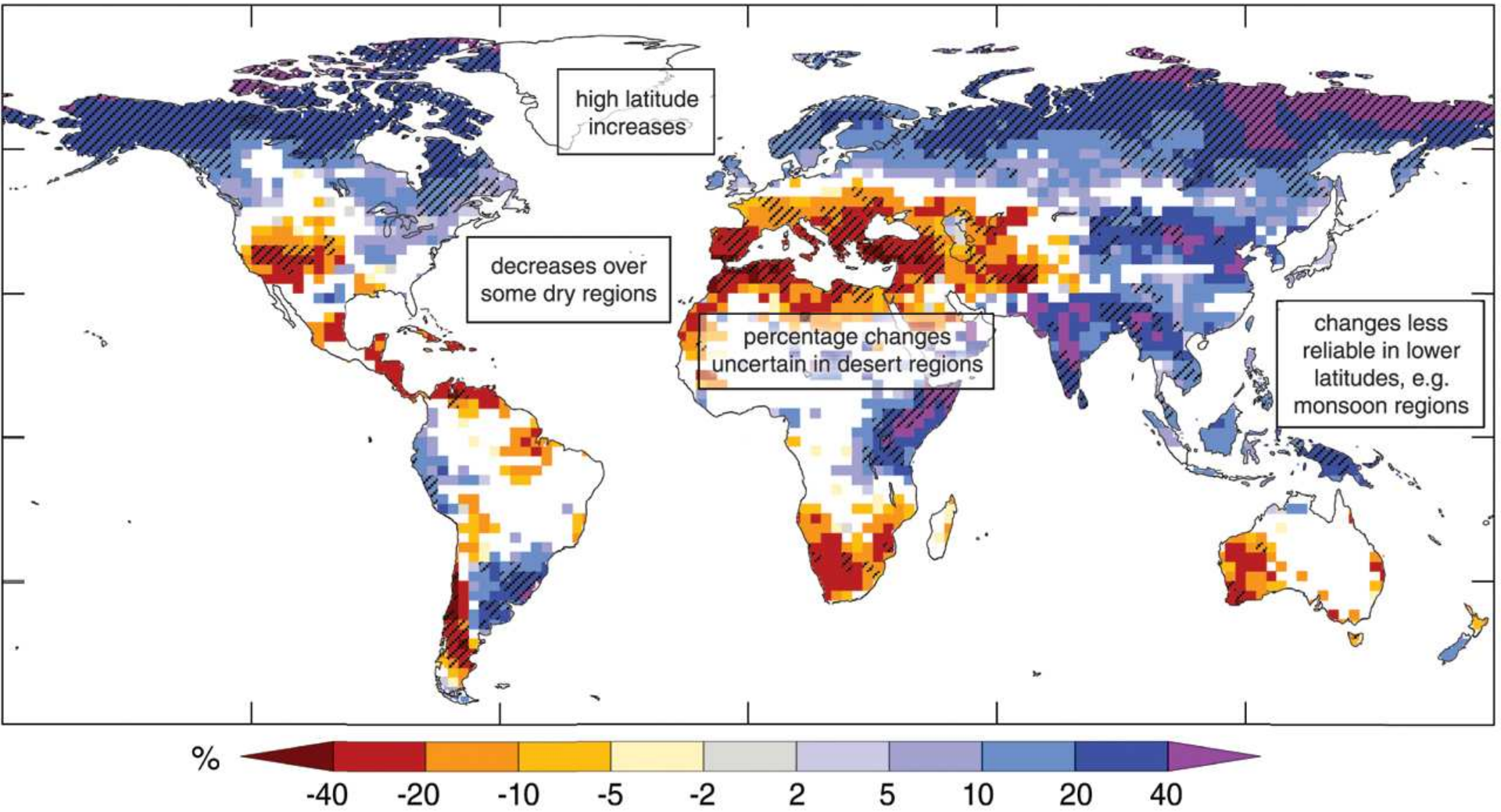


3.4. From a 2℃ to a 4℃ World by 2100

- Many scientists agree that the goal of the stabilization of global average temperature at 2□℃ above the pre-industrial level by the year 2100 is becoming increasingly unlikely. An increase of 2–4□℃ is becoming more probable.
- This may result in a ‘dangerous climate change’, and an increase of 4–6□℃ above pre-industrial levels is becoming possible by 2100; this could result in a ‘catastrophic climate change’.
- In September 2009, a conference of the Royal Society (UK) addressed the impacts of a world experiencing the impacts of “four degrees and beyond” (New 2011), while Mark Lynas (2007) discussed Six degrees: Our future on a hotter planet.
- World Bank Study of November 2012 by Potsdam Institute of Climate Change Impact Research:we are moving to +4℃ wor ld
- Rahmsdorf study for COP 18 in Doha: Sea level rise: 50cm-1m

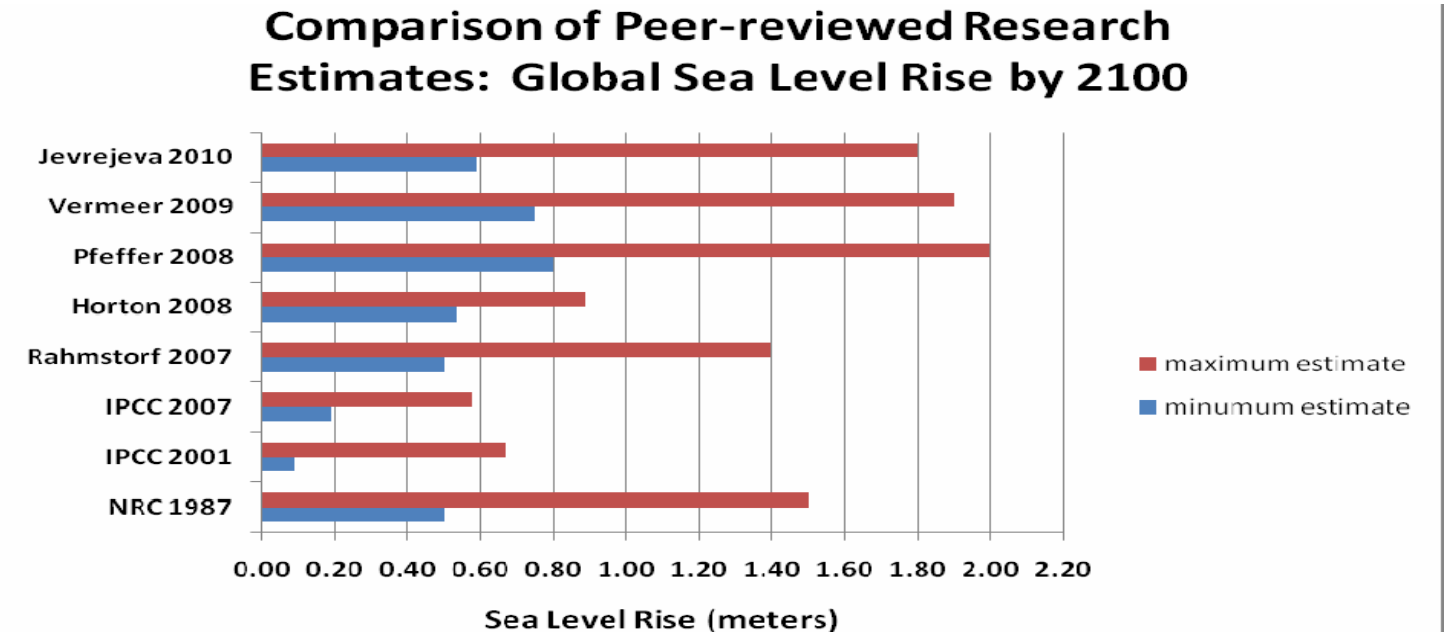
3.5. Precipitation Change by 2100:

Projections and model consistency of relative changes in runoff by the end of the 21st century

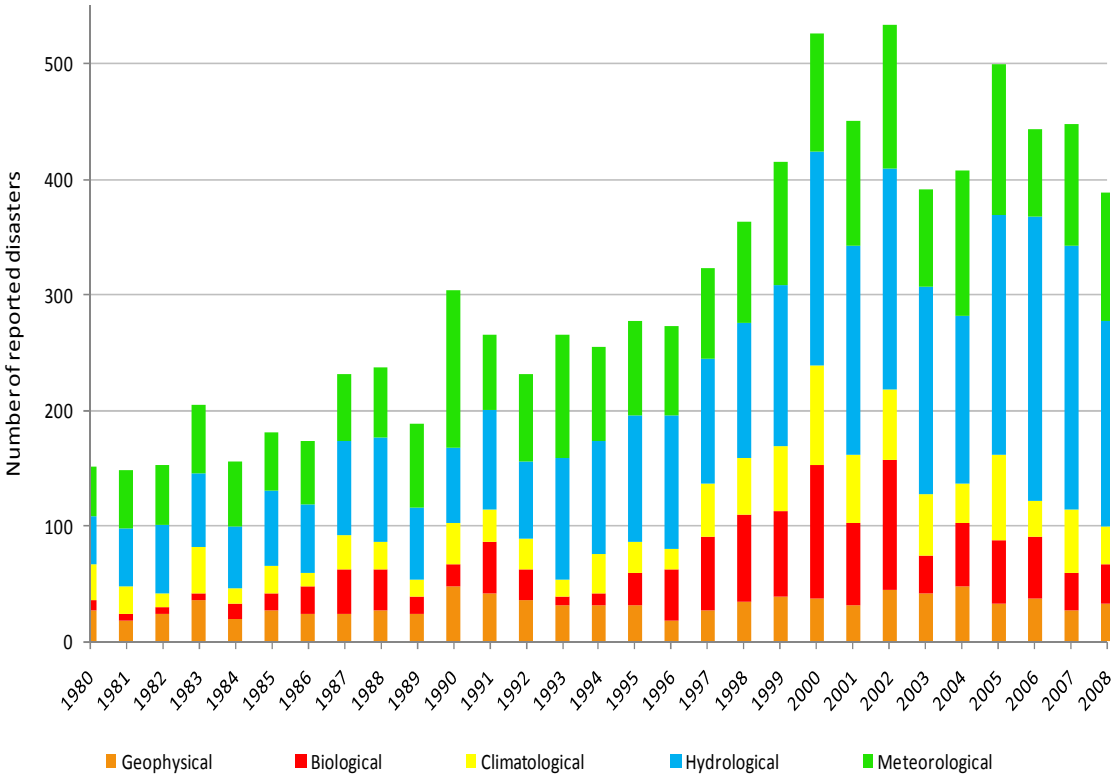


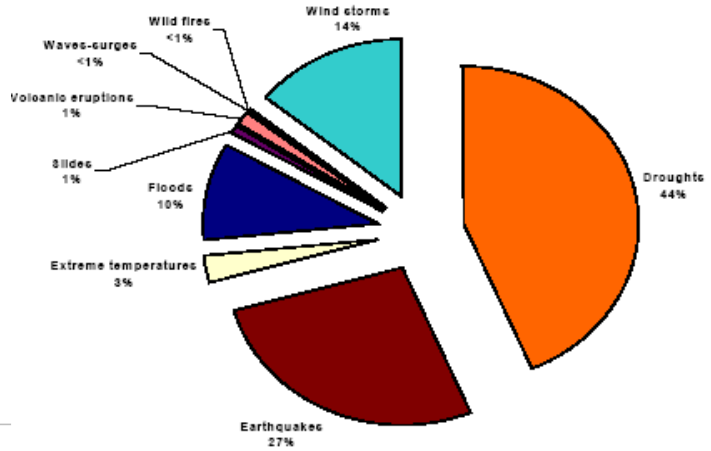
3.6. Projected Increase of Sea Level Rise (IPCC chair, Pachauri, 2008)

Stabilization level (ppm CO_2-eq)	Global mean temp. increase (°C)	Year CO_2 needs to peak	Global sea level rise above pre-industrial from thermal expansion (m)
445 – 490	2.0 – 2.4	2000 – 2015	0.4 – 1.4
490 – 535	2.4 – 2.8	2000 – 2020	0.5 – 1.7
535 – 590	2.8 – 3.2	2010 – 2030	0.6 – 1.9
590 – 710	3.2 – 4.0	2020 – 2060	0.6 – 2.4



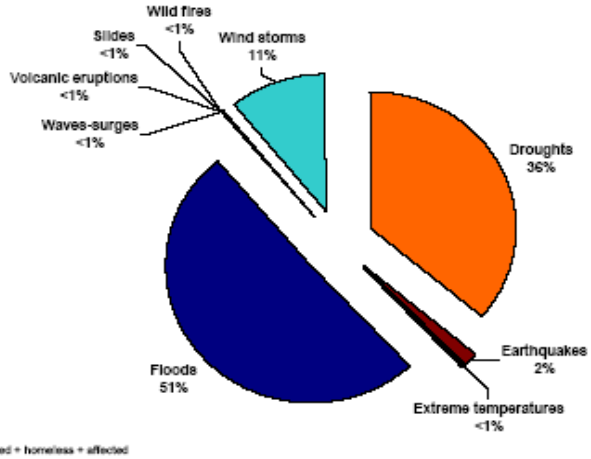
3.7. Climate-related natural hazards





Reported Death of Natural Hazards globally (1974-2003): 2.066.273 persons

Affected persons of Natural Hazards globally (1974-2003): 5 076 494 541 persons



Changes of Hydro-meteorological Hazards (Guha-Sapir 2010)

3.8. Tropical Cyclones: Threat to Megacities

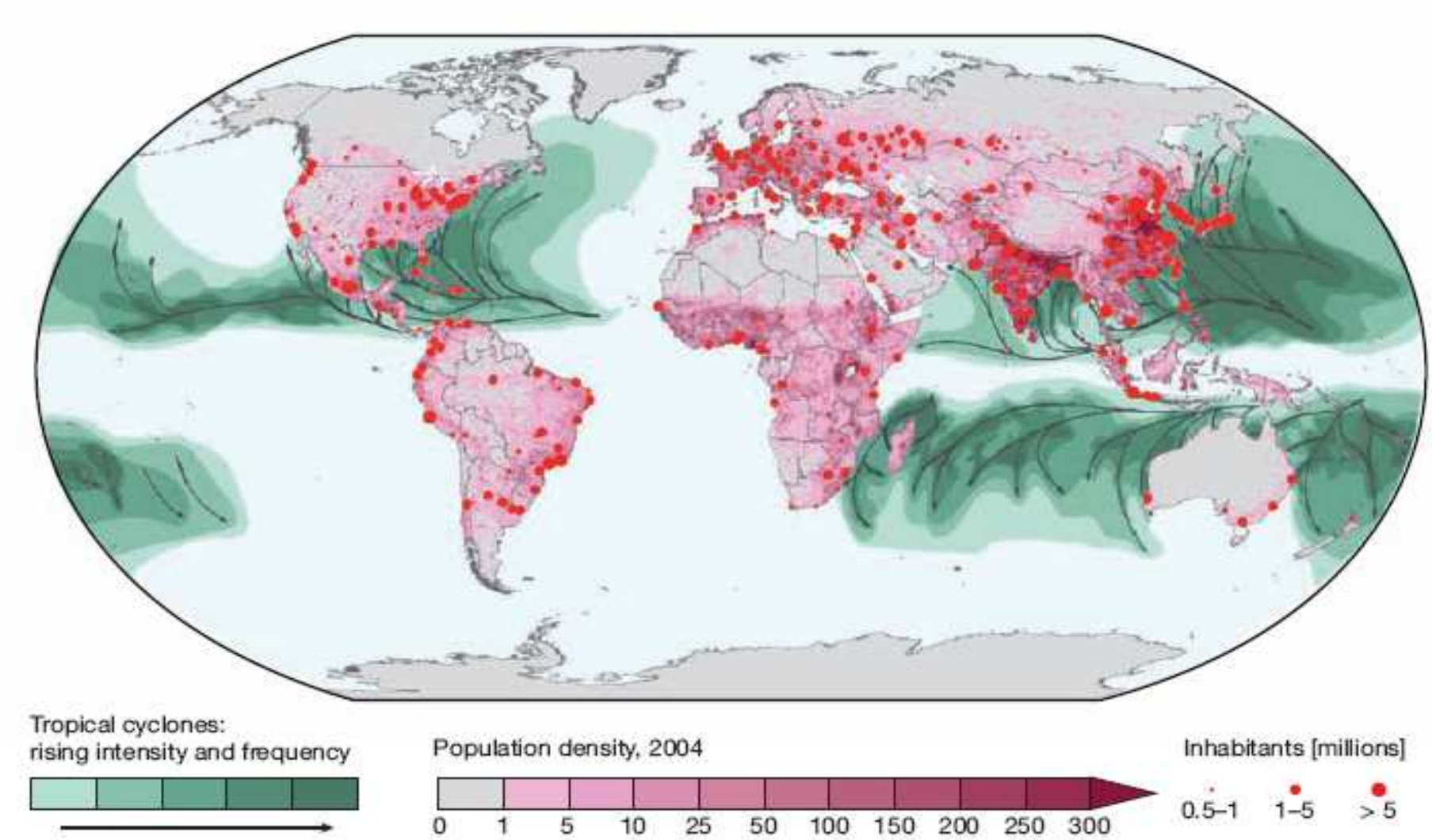
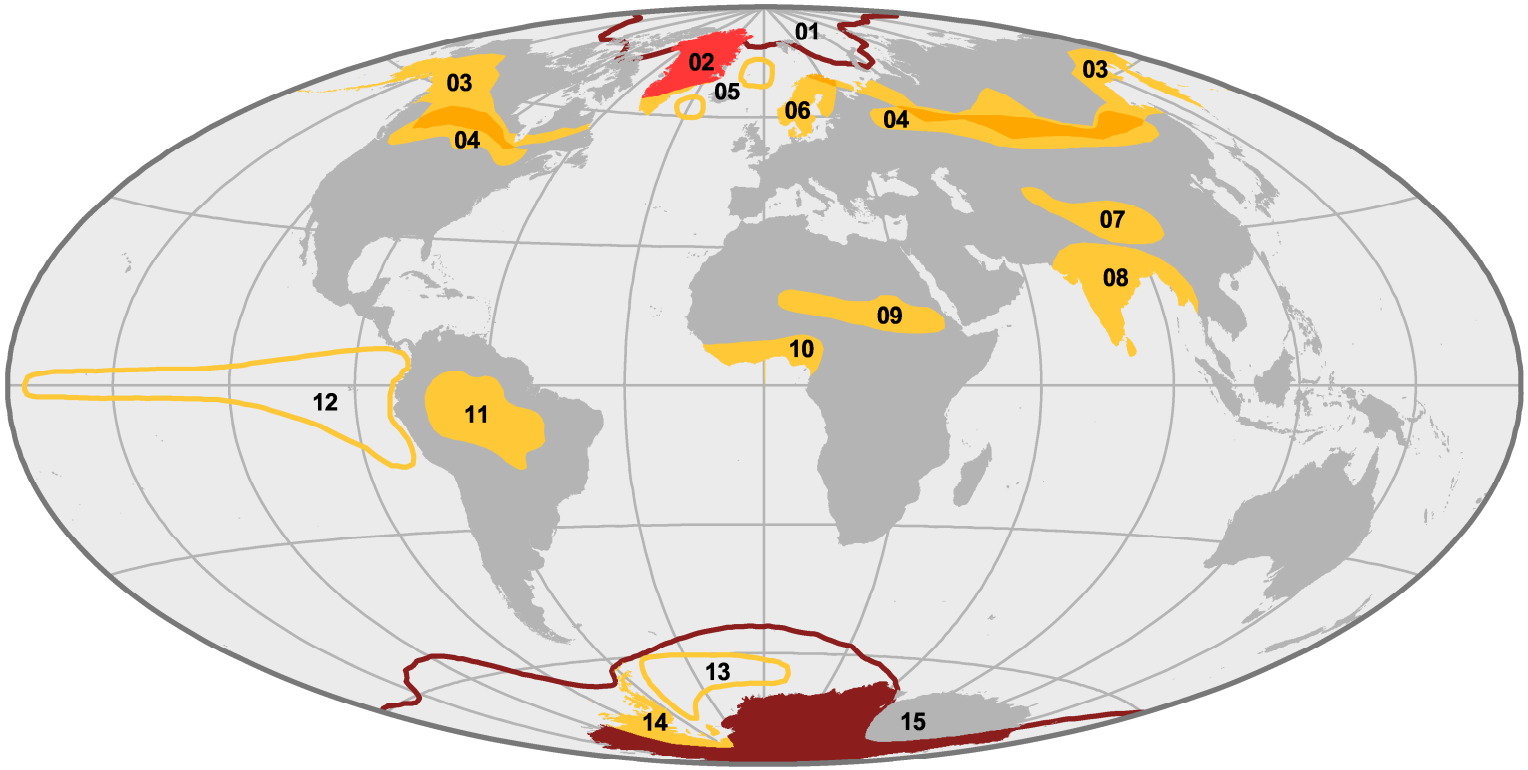


Figure 6.4-1
Tropical cyclone threat to urban agglomerations.
Cartography: Cassel-Gintz, 2006.
Source: WBGU

Potential Anthropogenic Tipping Elements in the Earth System



tipped already

in limbo

still stable

01 Arctic Sea Ice Loss

02 Greenland Ice Sheet

03 Thawing Permafrost / Methan Escape

04 Boreal Forest Dieback

05 Suppression of Atlantic Deep Water Formation

06 Climatic Change-Induced Ozon Hole over Northern Europe

07 Albedo Tibetan Plateau

08 Indian Monsoon

09 Re-Greening Sahara / Sealing of Dust Sources

10 West African Monsoon

11 Dieback of Amazon Rainforest

12 Southern Pacific Climate Oscillation

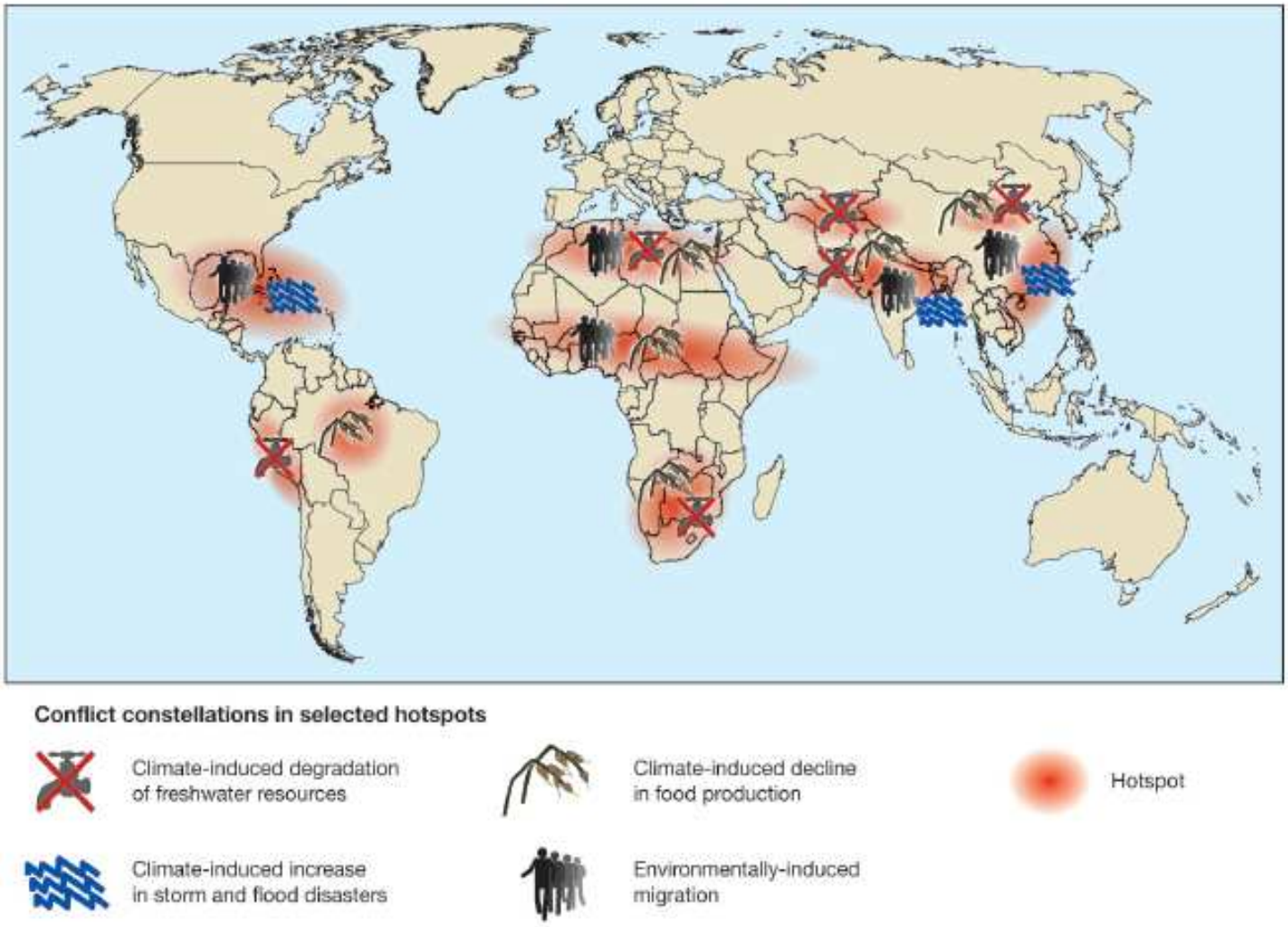
13 Antarctic Deep Water Formation / Nutrients Upwelling

14 Westantarctic Ice Sheet

15 Antarctic Ozone Hole

3.10. Global Climate Change Hotspots & Conflict Constellations

Figure 4.7: Regional hotspots and security risks associated with climate change. **Source**: WBGU (2008: 4). Reprinted with permission.



Security-related challenges in MENA region: Water scarcity to rise due to demand increase and supply decline

Rising food deficits

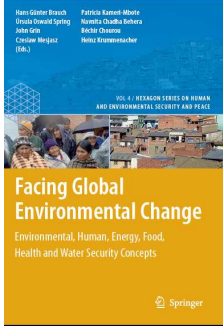
Rising environmentally induced migration

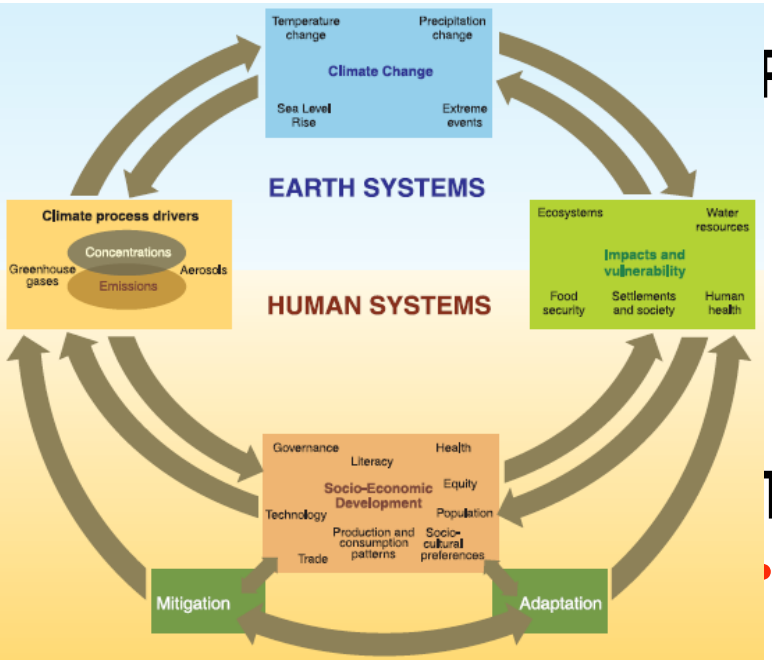
4. PEISOR Model on Climate Change: Geophysical Effects & Societal Outcomes

- **4 geophysical effects will most likely increase**
  - Temperature change (2℃ stabilization goal by 2100??)
  - Sea-level Rise much higher and longer lasting (threat)
  - Precipiation change (impact on drought, food security)
  - Increase in hydro-meteorological, climatological hazards

  Likelihood of crossing tipping points in climate system may rise
- **2℃ world increasingly unlikely, 4°-6℃ world more probable: dangerous,catastrophic Climate Change**
  - People‘s movement (displacement, distress migration)
  - Domestic, regional crisis & violent conflicts may increase
- **How to analyse these changes: models?**

4.1. Addressing Linkages of Global Climate Change and Security





Objects of Security Analysis (Securitization)

- Physical Effects: e.g. temp, rise
- Impacts: Sectors & Regions
- Societal Effects (migration, crises, conflicts

Whether they pose:

- **Objective Security Dangers**
- **Subjective Security Concerns**

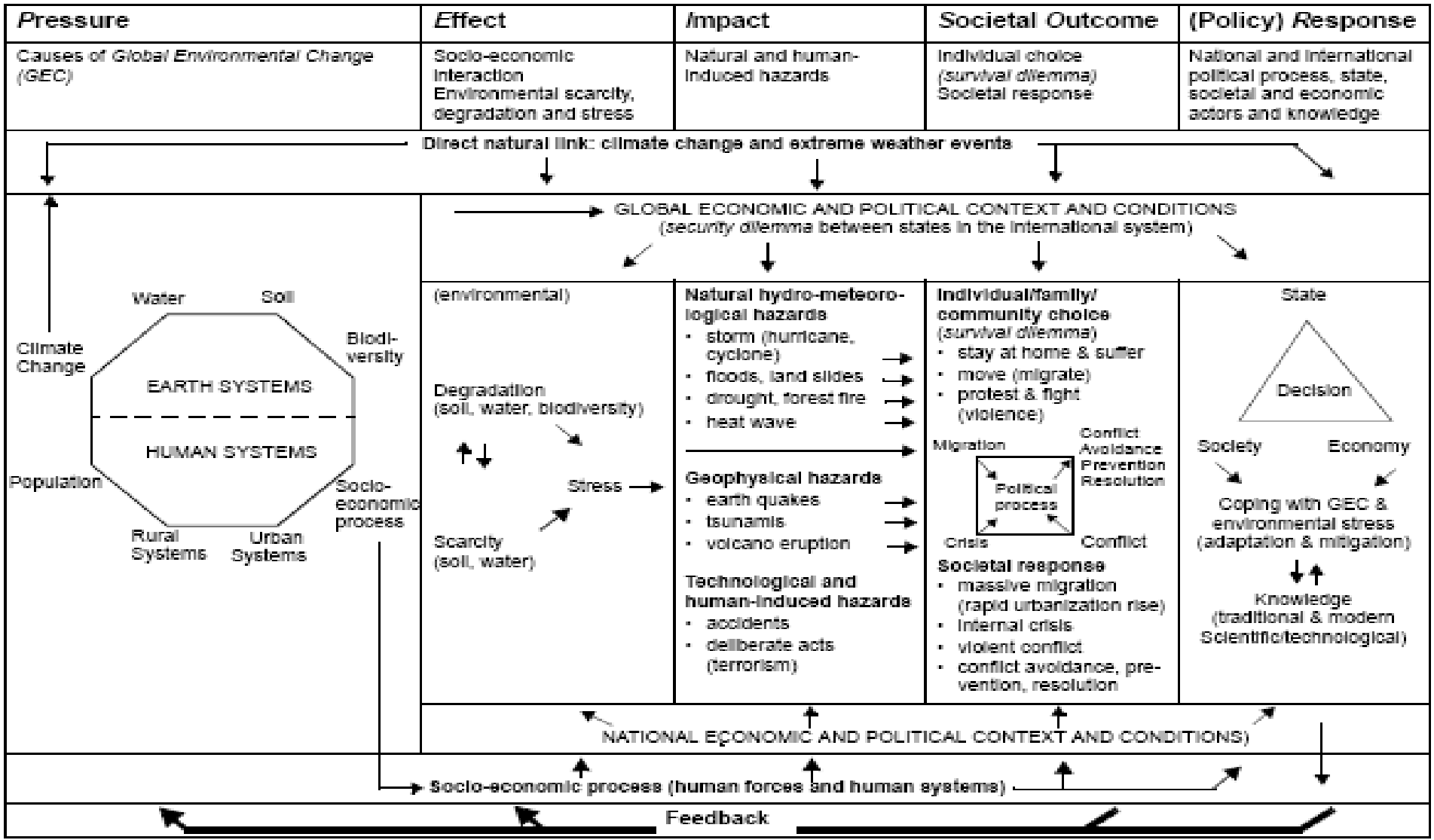
Four Schools

- Dramatizers: Climate wars
- Sceptics: lack of research (PRIO)
- **Empiricists: PEISOR Model & linkages**
- Trend & future scenarios

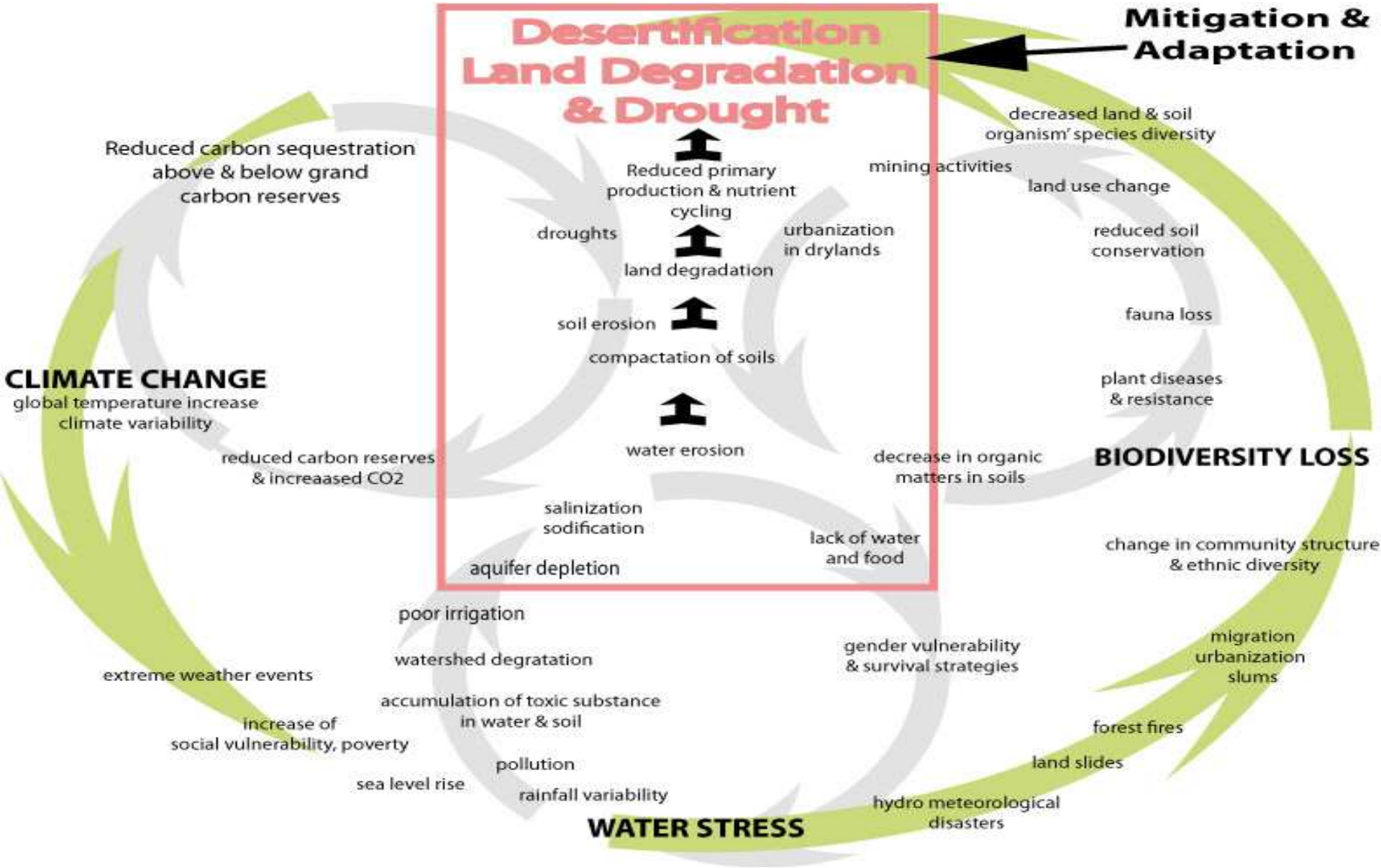
Two Approaches

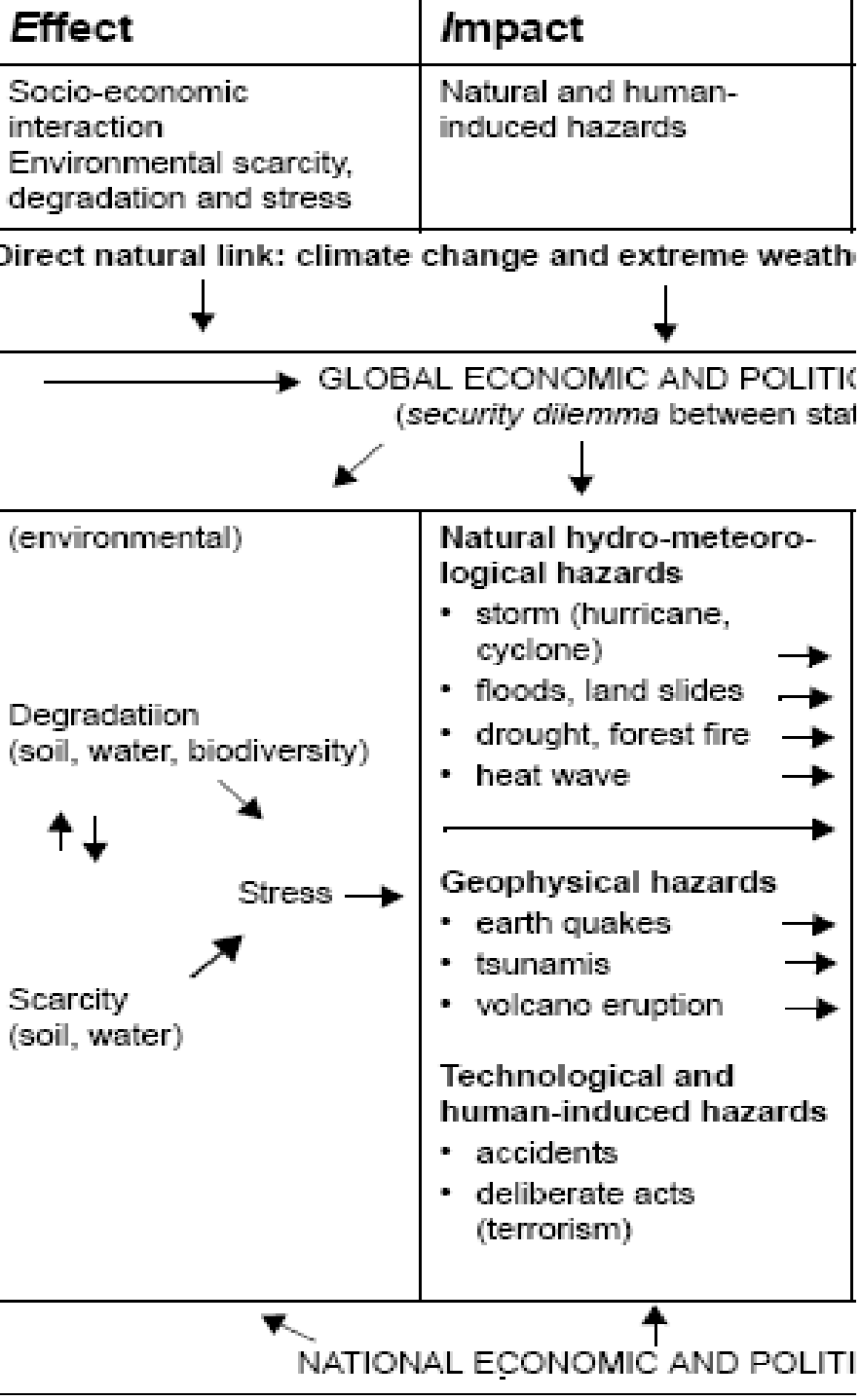
- **Policy & Scenario analysis (consultants)**
- **Causal analysis**
  - Natural phenomena -> migration, crises, conflicts (violence)
    - 2nd phase: Homer-Dixon, Bächler
    - 4th phase: Oswald – Brauch - Dalby
- **Discourse analysis:** climate change
  - International security
  - National security

4.2 Global Environmental Change & Impacts: PEISOR Model



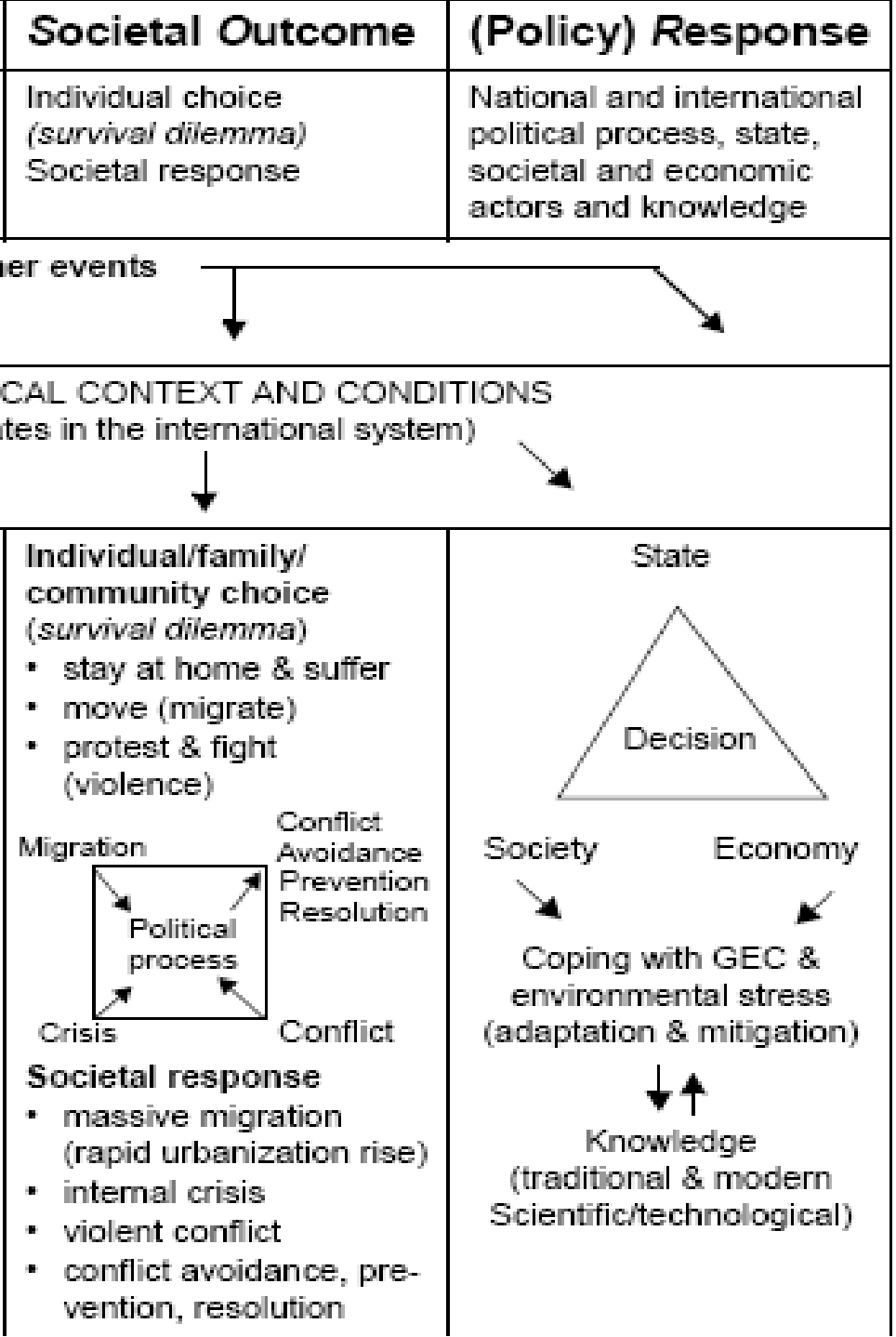
4.3 P: Pressure: Interactions of GEC





4.4. E: Effect & I: Impact

- **E: Environmental security debate of 1990s**
  - Toronto school
  - Swiss school (ENCOP):
  - **Soil scarcity > degradation > environmental stress**
- **I: climate change -> extreme weather events**
  - Hydrometeorological hazards
    - **Drought (wind erosion)**
    - Heatwaves
    - Forest fires
    - Storms (hurricanes)
    - **Flash floods & landslights (wind & water erosion)**



4.5. SO: Societal Outcomes

- Individual level (choice)
  - Human security perspective
  - Survival dilemma of humans
- State/society level
  - Hunger, famine
  - Migration to urban slums
  - Rural-rural migration
  - Transborder migration
    - Seasonal (labour, nomads)
    - Permanent
  - Crises: domestic
  - Conflicts:
    - Peaceful protests

4.6 R: Policy Response to Security Dangers posed by Global Environmental Change: Object

- **How? Responsive vs. proactive action**
  - **Response:** cost of non-action (Stern Report)
  - **Proactive:** anticipatory knowledge, learning, action
- **What? Addressing causes (Pressure)**
  - **Earth system:** environmental quartett
  - **Human:** productive/consumptive behaviour
- **Responding to Effects & Impacts**
  - **Environmental stress**
  - **Climate-related natural hazards**
- **Addressing Societal Outcomes:** Migration/Conflicts

5. Climate Paradox: Performance & Implementation Gap

- **Regarding KP targets, G-8 countries mixed performance.**
  - As ‘Country in transition’ Russia highest GHG emissions reduction.
  - The EU-27 met their targets under the KP & most members met their national targets under the EU’s ‘burden-sharing agreement’.
  - Only Canada, US & Japan clearly failed to stabilize their GHG emissions by the year 2000 to the level of 1990 and to achieve the GHG reduction targets to which they agreed when they signed the KP.
- **2007-2011: G-8 promised to reduce GHG by 80% (2050)**
- **Climate paradox hypothesis applies specifically to two laggards in climate change performance. Canada & USA share high CO2 emissions per capita and ‘way of life’, which is a part of the North American political culture and of the values, attitudes and behavior of most citizens.**
- **Climate paradox increases probability of violent conflicts**

5.1. Legal Obligations of the G8: UNFCCC (1992) & KP (1997)

There is a weak not very specific legal commitment

- **UNFCCC (1992): Art. 2, Objective:**

  The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, **stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system**. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

- **Kyoto Protocol (1997): Art. 3,1:**

1. The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by **at least 5 % below 1990 levels in the commitment period 2008 to 2012.**

5.2. GHG Emissions of G8

Country	UNFCCC (1992)		Kyoto Protocol (1997)		Re-duc-tion goal (%)	EU-15 Reduc-tion goal (%)	Performance (1990-2009) GHG reductions in % 1990 (base year)		
G8 countries	An-nex 1	An-nex 2	Annex B	In tran-sition		Burden-sharing agree-ment (1998)	EU Eurostat (2011) IEA [2011]	UNFCC (2009) Landuse change and forestry (LULUCF) Excl.	Incl.
1) USA	X		X		-7		+6.7	+7.2	+5.6
2) Canada	X		X		-6		+20.4	+17.0	+29.8
3) Japan	X		X		-6		+2.7	-4.5	-5.0
4) Germany	X		X		-8	-21	-25.4[-21.9]	-26.3	-23.0
5) UK	X		X		-8	-12.5	-27.1[-15.2]	-26.9	-27.7
6) France	X		X		-8	0	-8.3[+0.6]	-7.7	-12.9
7) Italy	X		X		-8	-6.5	-5.0[-2.0]	-5.4	-13.3
8) Russia		X		X	0		-29.7	-36.9	-57.2

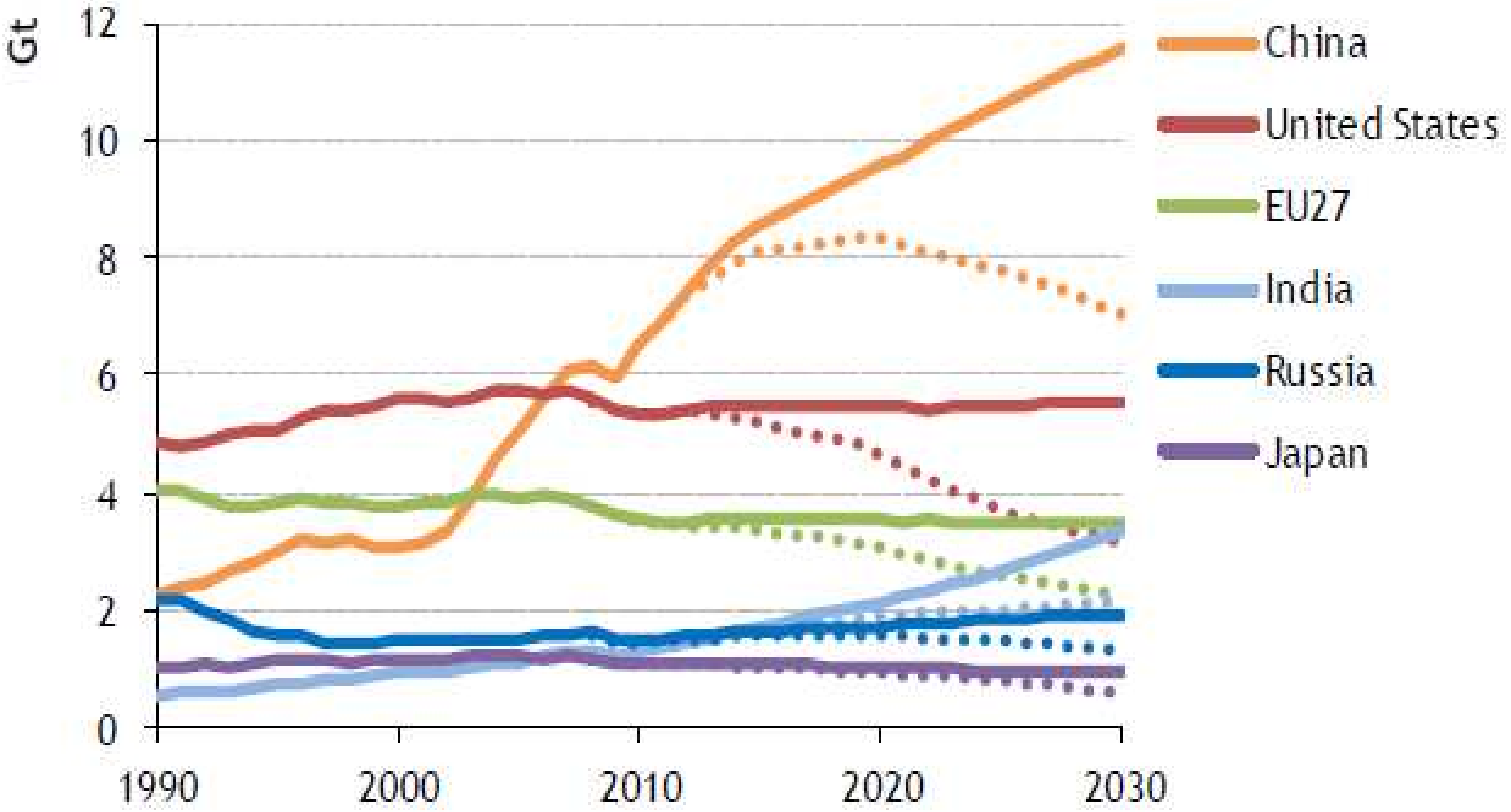
5.3. Paralysis of Climate Negotiations

- **Reagan Admin**. put climate change on G-7 agenda
- Domestic economic & ideological opposition: USA: Kyoto Protocol signed but not ratified
- Canada: withdrew in December 2011 from KP
- Canada, US, Japan (Australia) failed: Annex B targets
- COP 15 (Copenhagen) failed: US bypass UN negot.
- COP 16 (Cancun) Accords: voluntary commitments
- COP 17 (Durban): goal 2015 agreement, 2020 in force
- COP 18 (Doha): 26.Nov.-7 Dec. 2012:

Kyoto Protocol will run out by end of 2012: no agreement on legally binding GHG reduction targets:

My thesis: If present trends continue: security consequences of climate change may occur!

5.4. Energy-related CO2 Emissions for EU27, US, Japan, Russia, China & India (1990-2030)



5.5. Outcome of Doha (8-12-2012)

1) Amendment of the Kyoto Protocol

The Kyoto Protocol, as the only existing and binding agreement under which developed countries commit to cutting greenhouse gases, has been amended so that it will continue as of 1 January 2013.

- Governments have decided that the length of the second commitment period will be 8 years.
- The legal requirements that will allow a smooth continuation of the Protocol have been agreed.
- The valuable accounting rules of the protocol have been preserved.
- Countries that are taking on further commitments under the Kyoto Protocol have agreed to review their emission reduction commitments at the latest by 2014, with a view to increasing their respective levels of ambition.
- The Kyoto Protocol's Market Mechanisms – the Clean Development Mechanism (CDM), Joint Implementation (JI) and International Emissions Trading (IET) – can continue as of 2013.
- Access to the mechanisms will be uninterrupted for all developed countries that have accepted targets for the second commitment period.
- JI will continue to operate, with the agreed technical rules allowing the issuance of credits, once a host country's emissions target has been formally established.
- Australia, the EU, Japan, Lichtenstein, Monaco and Switzerland have declared that they will not carry over any surplus emissions trading credits (Assigned Amounts) into the second commitment period of the Kyoto Protocol.

5.6. Outcome of Doha (2012/2)

2) Time table for the 2015 global climate change agreement and increasing ambition before 2020

Governments have agreed to speedily work toward a universal climate change agreement covering all countries from 2020, to be adopted by 2015, and to find ways to scale up efforts before 2020 beyond the existing pledges to curb emissions so that the world can stay below the agreed maximum 2 degrees Celsius temperature rise.

- A significant number of meetings and workshops are to be held in 2013 to prepare the new agreement and to explore further ways to raise ambition.
- Governments have agreed to submit to the UN Climate Change Secretariat, by 1 March 2013, information, views and proposals on actions, initiatives and options to enhance ambition.
- Elements of a negotiating text are to be available no later than the end of 2014, so that a draft negotiating text is available before May 2015.
- In Doha, the UN Secretary General Ban Ki-moon announced he would convene world leaders in 2014 to mobilize the political will to help ensure the 2015 deadline is met.

3) Completion of new infrastructure

In Doha, governments significantly advanced the completion of new infrastructure to channel technology and finance to developing nations and move toward the full implementation of this infrastructure and support. Most importantly, they have:

- endorsed the selection of the Republic of Korea as the location of the Green Climate Fund and the work plan of the Standing Committee on Finance. The Green Climate Fund is expected to start its work in Sondgo in the second half of 2013, which means that it can launch activities in 2014.
- confirmed a UNEP-led consortium as host of the Climate Technology Center (CTC), for an initial term of five years. The CTC, along with its associated Network, is the implementing arm of the UNFCCCs Technology Mechanism. Governments have also agreed the constitution of the CTC advisory board.

5.7. Outcome of Doha (2012/3)

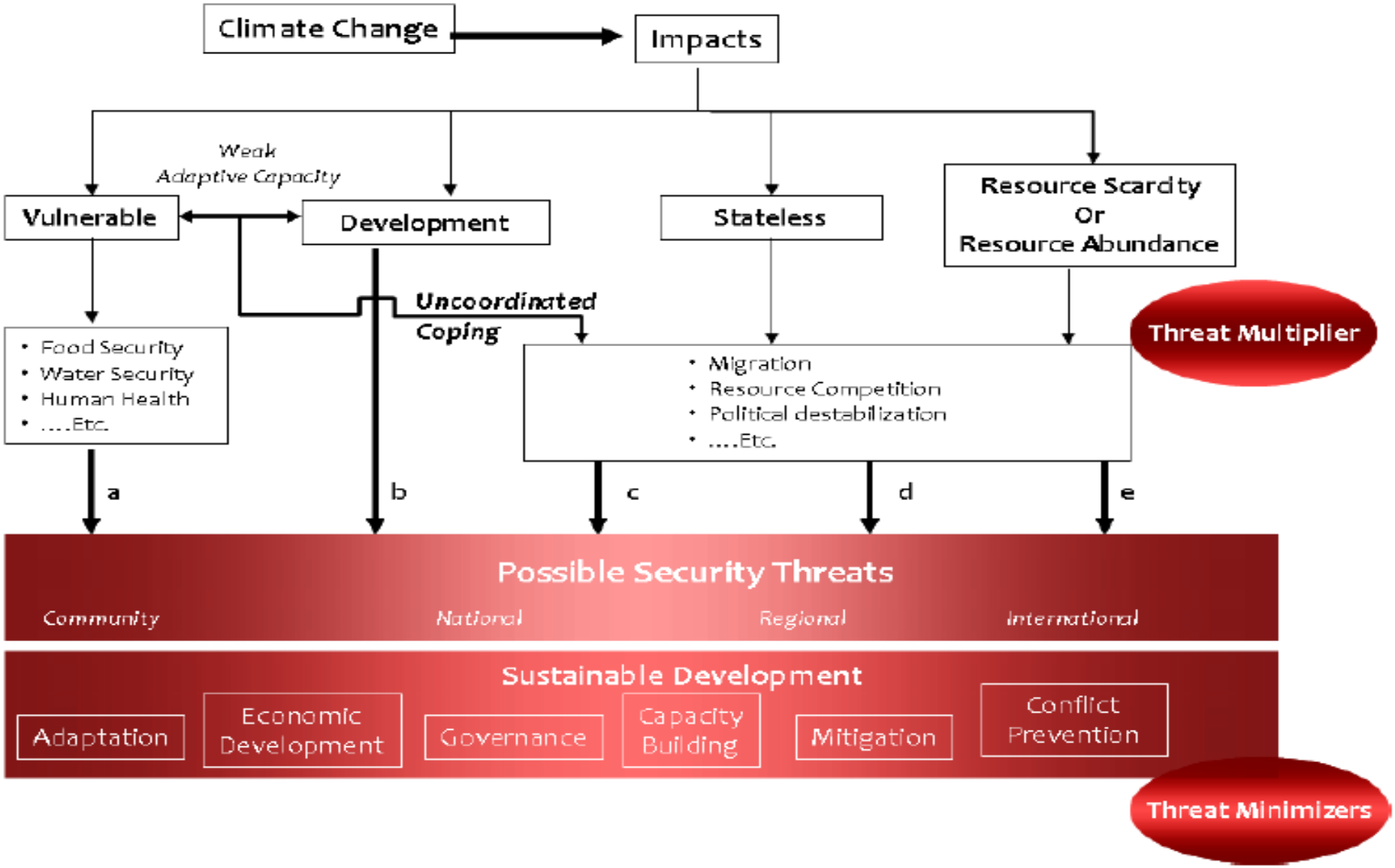
4) Long-term climate finance

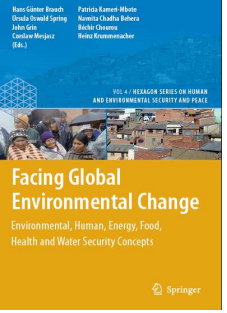
- Developed countries have reiterated their commitment to deliver on promises to continue long-term climate finance support to developing nations, with a view to mobilizing 100 billion USD both for adaptation and mitigation by 2020.
- The agreement also encourages developed countries to increase efforts to provide finance between 2013-15 at least to the average annual level with which they provided funds during the 2010-2012 fast-start finance period. This is to ensure there is no gap in continued finance support while efforts are otherwise scaled up.
- Governments will continue a work programme on long-term finance during 2013 under two co-chairs to contribute to the on-going efforts to scale up mobilization of climate finance and report to the next COP on pathways to reach that target.
- Germany, the UK, France, Denmark, Sweden and the EU Commission announced concrete finance pledges in Doha for the period up to 2015, totaling approximately 6 billion USD.

Review

- Governments have launched a robust process to review the long-term temperature goal. This will start in 2013 and conclude by 2015, and is a reality check on the advance of the climate change threat and the possible need to mobilize further action.

6. Report of UN-Sec-General (11.9.2009)





6.1. First Discourse: Securitization of GEC: Climate Change & Security

- **Not they but „we are the threat“ of global warming**
- **Intersubjective approach: Security: what actors make of it**
  - **2007 was the turning point for the securitization of climate change**
    - **February: IPCC Fourth Assessment Report**
    - **April: UN Security Council debate**
    - **June: WBGU-Report: impact on EU debate**
    - **October: Nobel peace prize for IPCC and al Gore**
- **3 fold debate & discourse on climate change:**
  - **International Security**:
    - Goal: Strategies of conflict prevention by a proactive environmental, economic and development policy
  - **National Security:**
    - 2007: new military mission for US Department of Defense
  - **Human Security:** HS Network, Greek presidency (5/ 2008)
    - GECHS Project of IHDP: Social Vulnerability of poor & marginalized population groups

6.2. First Discourse: Securitization of Climate Change - Three Security Policy Debates

Climate change & internat. security discourse

- **UN (17 April 2007):** FM M. Beckett, UK presidency
- **EU (2008):** EC & Council Study & roadmap process
- UN GA (June 2009) Res., Report by Sec. General

Climate change & national security discourse:

- **US studies:** CNA, CSIS, NIC (CIA), NSS 2010

Climate change & human security discourse

- IHDP (GECHS): Lonergan & Brklacich (chairnen)
  - 2005: conference in Norway on Cliamte change and human security
- HSN (Canada was a co-founder & a major sponsor)
- 2007/2008: Greek HSN presidency
- **2011-2014: IPCC, WG II, chapter on human security**

6.3. UN Debates on Climate Change and International Security

17 April 2007: UN Security Council: tabled by Ms.Beckett (UK)

- **<http://www.un.org/News/Press/docs/2007/sc9000.doc.htm>**
- **<http://www.un.org/News/Press/docs/2007/sgsm10949.doc.htm>**

3 June 2009: UN General Assembly Resolution:

- 1. *Invites* the relevant organs of the United Nations, as appropriate and within their respective mandates, to intensify their efforts in **considering and addressing** climate change, including its possible security implications;
- 2. *Requests* the Secretary-General to submit a **comprehensive report** to the General Assembly at its sixty-fourth session on the **possible security implications of climate change**, based on the views of the Member States and relevant regional and international organizations.

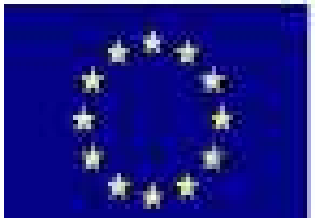
August-September 2009: submission by states (31 replies)

- **<http://www.un.org/esa/dsd/resources/res_docugaecos_64.shtml>**

11 September 2009: Report by Ban-Ki Moon

- **<http://www.un.org/ga/search/view_doc.asp?symbol=A/64/350>**

6.4. EU Paper: Climate Change & International Security (3/2008)



- **Climate change … as a threat multiplier of existing trends, tensions and Instability, that overburdens fragile and conflict prone states and regions**
- **Seven international security threats from climate change**:
  - 1) Resource conflicts (Water, soil, food);
  - 2) Economic damage and risks for coastal cities;
  - 3) Loss of territory and border conflicts;
  - 4) Environmentally-induced migration;
  - 5) Situations of fragility and radicalization
  - 6) Tensions on energy supply
  - 7) Pressure on international politics
- **Regions, where these threats become manifest**
  - Africa, Middle East, South Asia; Central Asia, Latin America, Arctic.
- **Central challenge: Environmental Migration**
- **December 2008: Implementation paper of ESS (2003)**
- **Roadmap Process: DG External Relations not DG Environment**
- **Interregional debates: EU- ASEAN Regional Forum**

6.5. ASEAN REGIONAL FORUM

Seminar on International Security Implications of Climate Change

Brussels, 18-19 November 2010

Session 2.1: Challenges, Threats, Risks related to Climate Change
Session 3.2: The Way Forward: A View From Civil Society

10. Potential Societal Impacts of the Physical Effects of Climate Change

Hans Günter Brauch

Adj. Prof. [PD], Free University Berlin, Otto-Suhr-Institute
Senior Fellow, (UNU-EHS), Bonn
Chair, Peace Research and European Security Studies
Editor, Hexagon-Book Series on Human, Environmental Security & Peace

UNITED NATIONS UNIVERSITY
UNU-EHS
Institute for Environment and Human Security

Freie Universität Berlin

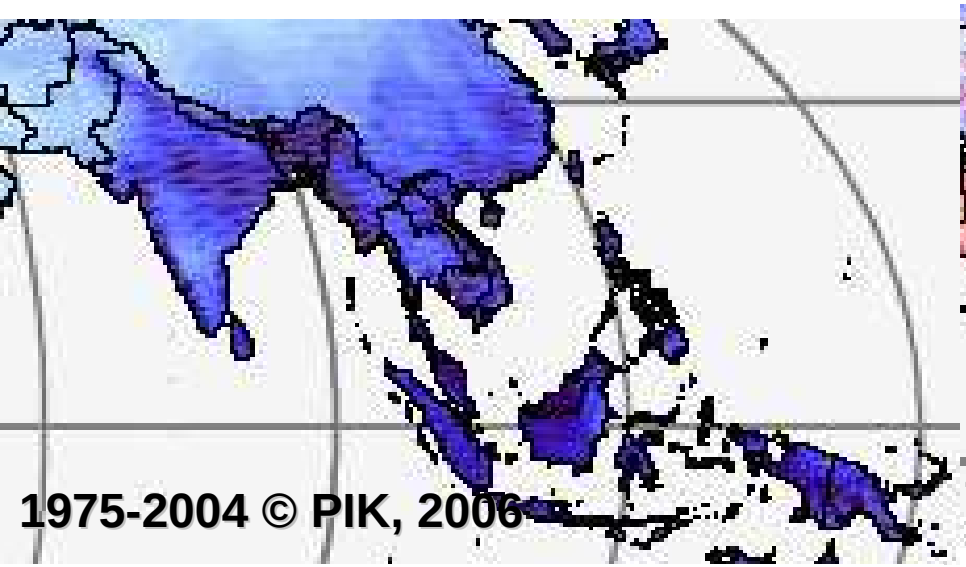
AFES-PRESS

6.6. Sea Level Rise as a Security Threat? TAR (2001: p. 569)

Country	SLR (cm)	Potential land loss		Population exposed	
		km^2	%	million	%
Bangladesh	45	15,668	10.9	5.5	5.0
		29,846	20.7	14.8	13.5
India	100	5,763	0.4	7.1	0.8
Indonesia	60	34,000	1.9	2.0	1.1
Japan	50	1,412	0.4	2.9	2.3
Malaysia	100	7,000	2.1	>0.05	>0.3
Pakistan	20	1.700	0.2	n.a.	n.a.
Vietnam	100	40,000	12.1	17.1	23.1

Vietnam is the most vulnerable country to climate change due to sea-level rise in South East Asia. In South-East Asia food & fibre, biodiversity, coastal ecosystems, human health and land degradation are highly vulnerable to climate change while water resources and human settlements are moderately vulnerable.

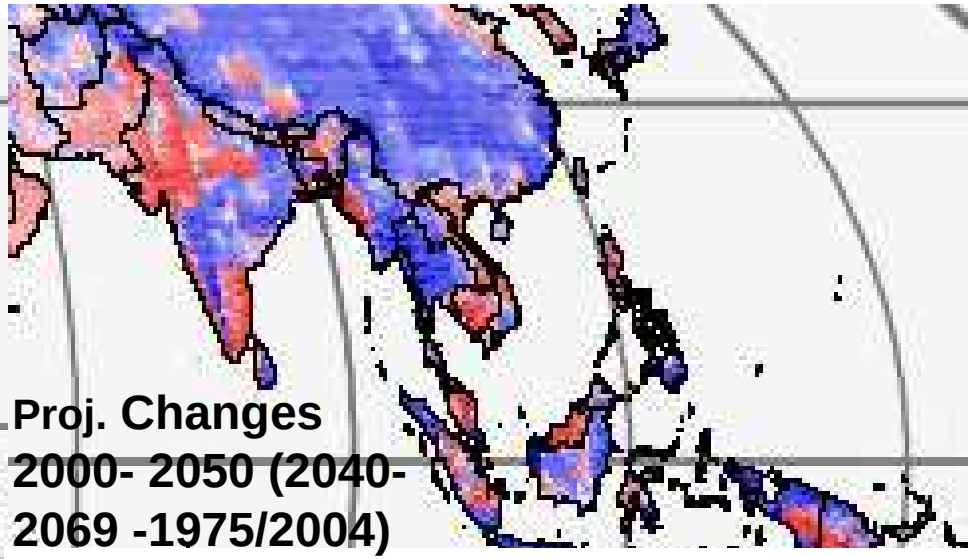
6.7. Potential Dangers by Flash Floods in South and Southeast Asia. Source: ©PIK 2006



1975-2004 © PIK, 2006

Mittel der Werte über dem 95% Quantil [mm]

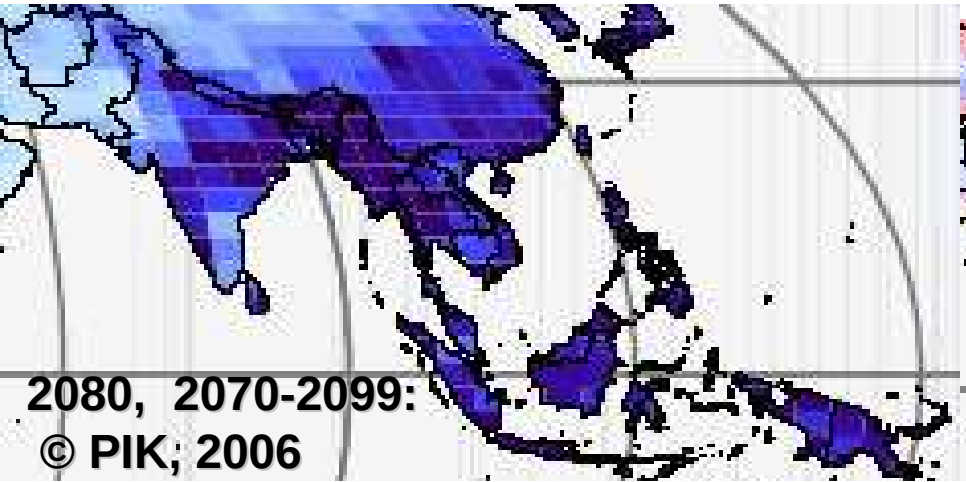
0 5 20 50 100 150 200 250 300 350 400 450 500



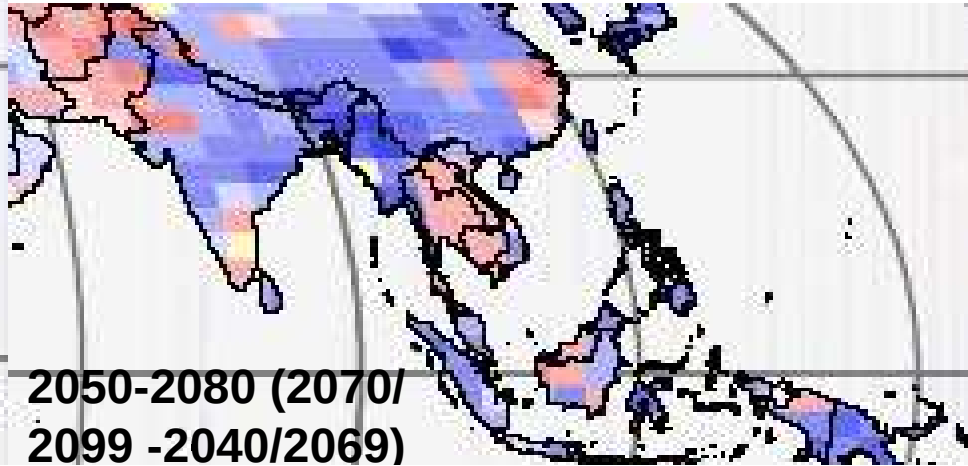
Proj. Changes 2000- 2050 (2040-2069 -1975/2004)

Veränderung der Mittelwerte über dem 95% Quantil [mm]

-300 -200 -100 -50 -20 -5 -1 1 5 20 50 100 200 300

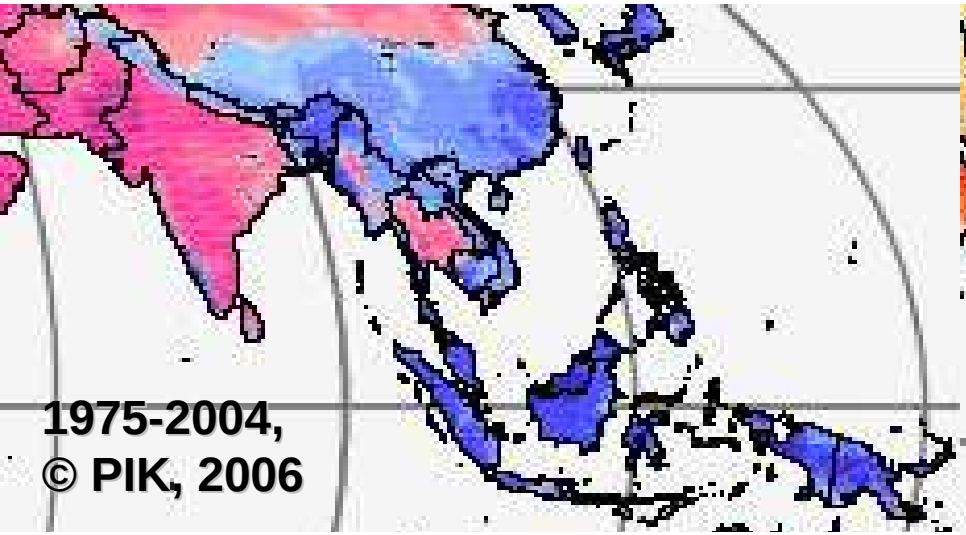


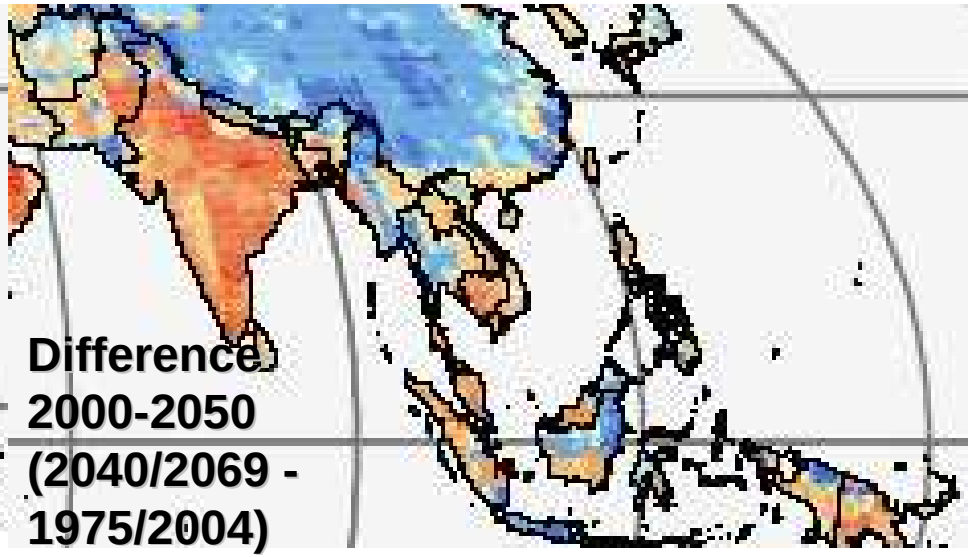
2080, 2070-2099: © PIK, 2006



2050-2080 (2070/2099 -2040/2069)

6.8. Potential Threats by Drought, 1975-2004 & Projections: 2050, 2080 © PIK



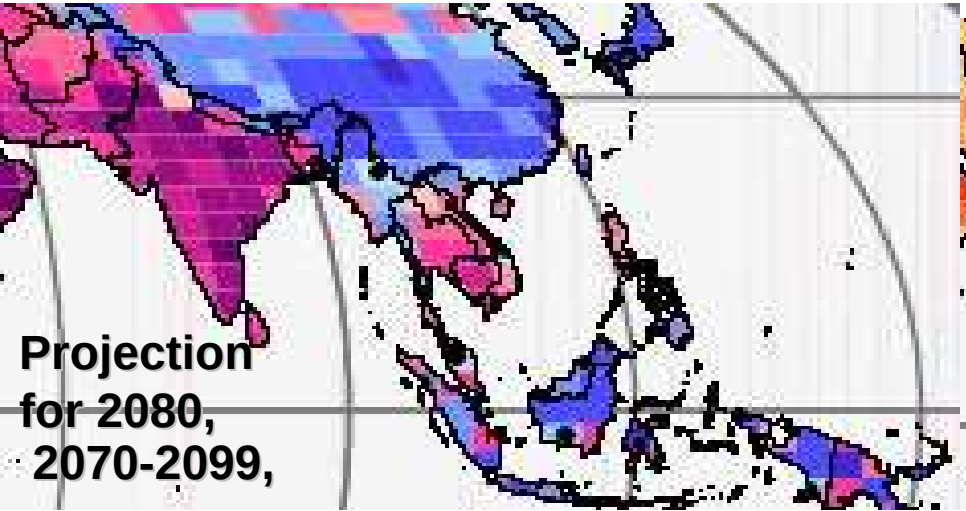


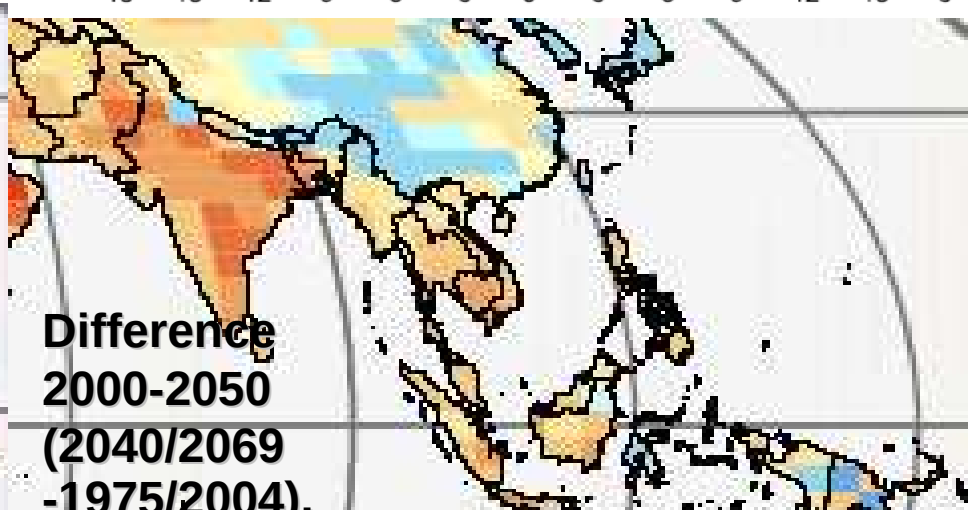
Klimatische Wasserbilanz [mm]

-18 -15 -12 -9 -6 -3 0 3 6 9 12 15 ^ 3

Veränderung der Klimatischen Wasserbilanz [mm]

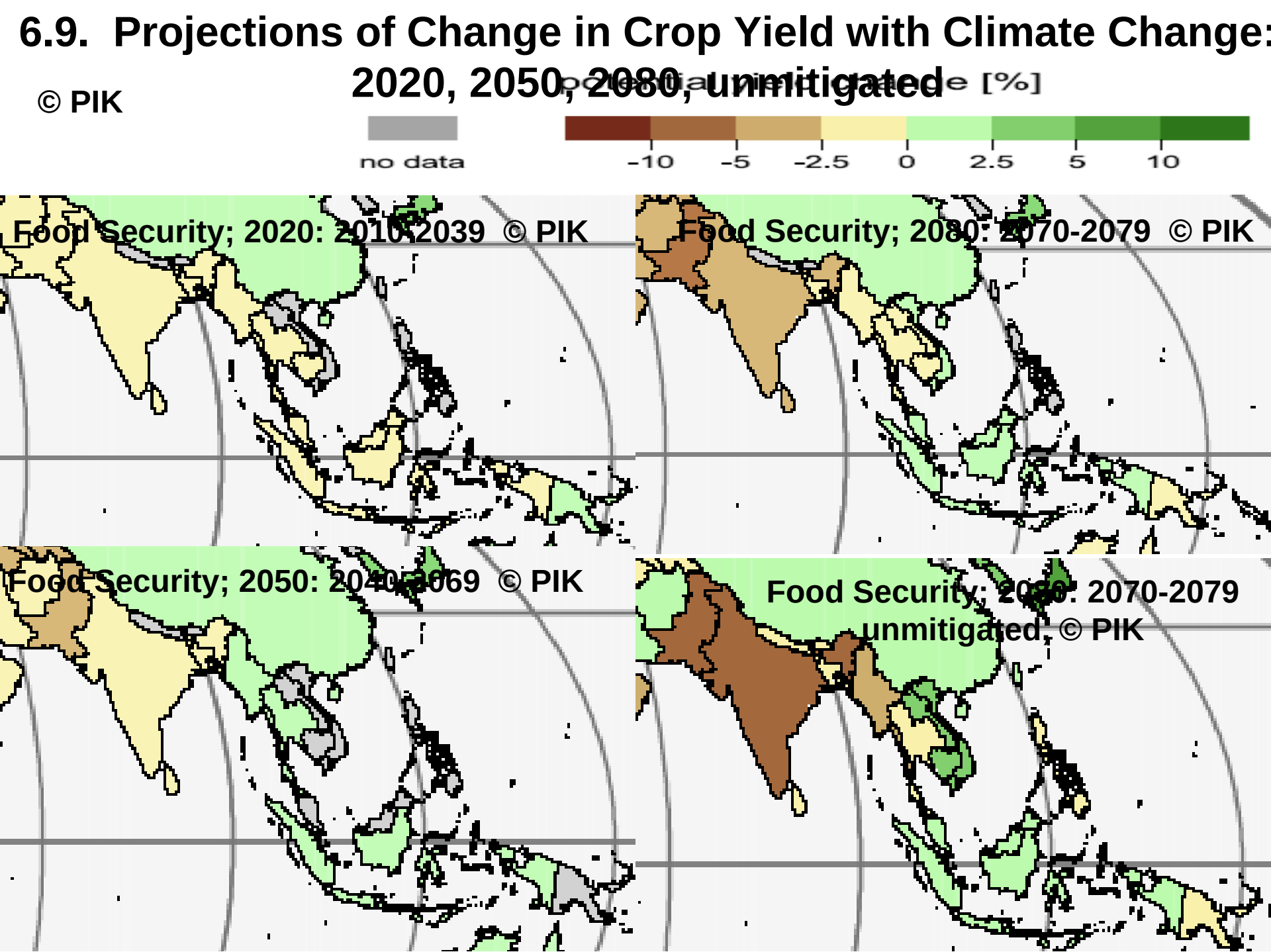
-18 -15 -12 -9 -6 -3 0 3 6 9 12 15 ^ 3





6.9. Projections of Change in Crop Yield with Climate Change: 2020, 2050, 2080, unmitigated

© PIK



6.10. Discourse 2: Climate Change & National Security: USA

Climate changes as a threat for US national security ➔Reactive search for military answers and for new miligary missions of the Pentagon

- 2001 Bush opposes the Kyoto Protocol, to accept mandatory limits of GHG-Emissions
- **Pentagon study** of Schwartz/Randall: (October 2003, February 2004)
- **Gilman, Randall, Schwartz:** Effects of cliamte change: System vulnerabiltiy of possible effects up to 2050 medium scenario of temperature increase
- **March 2007: Strategic Studies Institute:** Colloquium on "global cliamte change: National Implications for Security"
- **March 2007:** Senators Durbin (D-IL)/Hagel (R-NE): Law on intelligence assesments on cliamte change impacts on national security
- **April 2007: CNA:** *National Security & the Threat of Climate Change* (April 2007): climate change as a threat multiplier in vulnerable regions for US security
- **November 2007,** *Center for Strategic and Intern. Studies* (CSIS); *Centre for a New American Security* (CNAS): *The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change*
- 2007 Military establishment begin to perceive CC as national security issue
- **2009 President Obama takes office and declares CC as „a matter of urgency and of national security"**
- **2010: QDR (February) and National Security Strategy (May 2010)**

6.11. Obama Administration: CIA & DoD

- **CIA** Ignored 2004 CC as a security threat in itsprojetion of the world in 2020
- Growing work on identifying regions with risks regarding likelihood of wars
- Feb 2009 announcement to open Center on CC and National Security
- Issues: rising sea level, desertification and pop. shifts as nat. security issues
- **CIA has ignored CC as an international security threat until 2007**
- CIA should pinpoint regions with high risk levels and the likelihood of wars
- **2011: Republicans in US Congress cut funding for Center on CC/National Security**

Pentagon and the Military

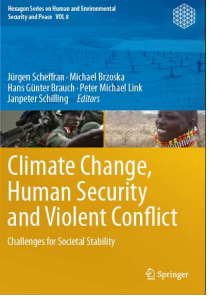
- **DoD should determine how CC affects US security (extreme weather events, new armed conflicts with US-military)**
- **Up to 2007 two main actors in the administration on climate policy**
  - Head of the White House Council on Environmental Quality
  - State Department, Bureau of Oceans and International Environmental and Scientific Affairs
- DoD: undersecretary dealing with security concerns posed by natural hazards
- DoD included a climate section in the Quadrennial Defense Review (Feb 2010)
- Adaptation on CC for soldiers/military bases abroad (extreme heat, rising sea level), Issue of environmental footprint of military

6.12. US National Security Strategy (May 2010)

- **The danger from climate change is real, urgent, and severe**. The change wrought by a warming planet will lead to new conflicts over refugees and resources; **new suffering from drought and famine; catastrophic natural disasters**; and the **degradation of land across the globe**. The United States will therefore confront climate change based upon clear guidance from the science, and in cooperation with all **nations—for there is no effective solution to climate change that does not depend upon all nations taking responsibility for their own actions and for the planet we will leave behind.**
- ***Abroad*:** Regionally, we will build on efforts in Asia, the Americas, and Africa to forge new **clean energy partnerships.** Globally, we will seek to implement and build on the Copenhagen Accord, and ensure a response to climate change that draws upon decisive action by all nations**. Our goal is an effective, international effort in which all major economies commit to ambitious national action to reduce their emissions**, nations meet their commitments in a transparent manner, and the **necessary financing is mobilized so that developing countries can adapt to climate change, mitigate its impacts, conserve forests, and invest in clean energy technologies**. We will pursue this global cooperation through multiple avenues, with a focus on advancing cooperation that works. We accept the principle of common but differentiated responses and respective capabilities, but will insist that any approach draws upon each nation taking responsibility for its own actions.

6.13. Discourse 3: Climate Change & Human Security

- **IHDP-GECHS** (Global env. change & human security)
  - **Symposium: climate change & human security (2005)**
  - **Synthesis conference: Research (1999-2009) in Oslo**
- **Greek Presidency of the HSN (2007/2008)**
  - **Conference in May 2008 in Athens: Final declaration**
  - Impact of climate change on vulnerable groups: women, children, environmental migrants in developing countries
  - Policy paper: Climate change, human security and development
  - **3rd pillar of human security: "freedom from hazard impact"**
- **Policy Memorandum 15 April 2007: for UN SC debate**
  - Wisner, Brauch, Oswald Spring u.a.
- **Debate in UN General Assembly (in debate on HS)**
  - **May 2007:** human security: climate change as a threat
  - **June 2009:** Resolution on climate migration: intern. peace & security
- **Reports of SG on Human Security (2010 and 2012)**
- **IPCC: AR 5, WG II, Chapter 12: Climate change & HS**

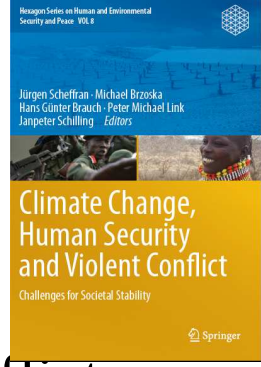


6.14. Scientific Discourses in Europe

- **Securitizing of Climate Change: Copenhagen, 03- 2009**
  - Olaf Cory: Securtisation and Risifikation of CC: **Millennium**,1/2012
- **PRIO: Climate Change and Conflicts; June 2010: Trondheim conference**
  - **Special Issue of Journal of Peace Research, 49/1, Janaury 2012**
  - **Guest Editor: Nils Petter Gleditsch, PRIO**
  - Quantative, macro-sociological approach
  - Ignores qualiative and policy-oriented debates
- **CLISEC (Hamburg Conf., November 2009):**

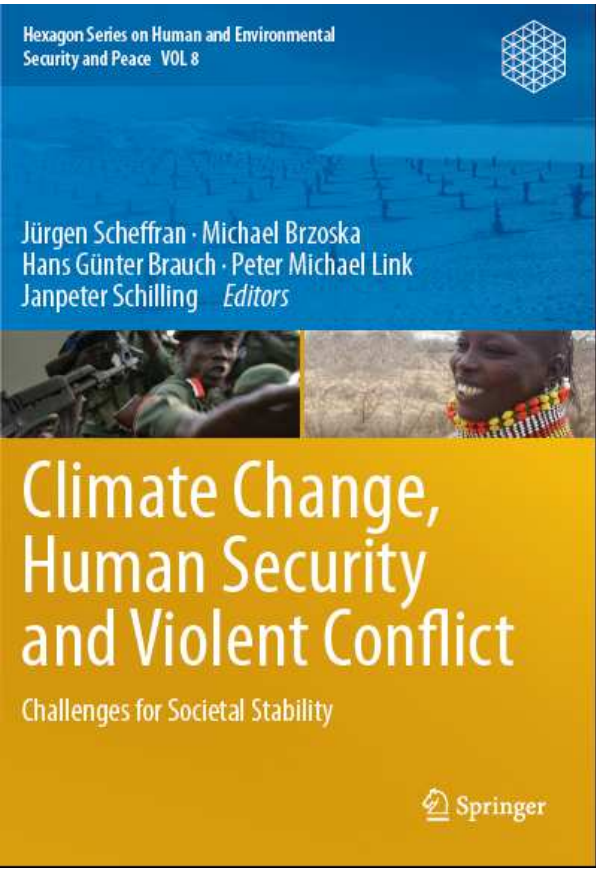
  Research Group Climate Change & Security conducts multidisciplinary research & education on potential security risks, social instabilities & conflicts induced by climate change & on strategies for international cooperation, conflict management & sustainable peace.
  - Scheffran, Jürgen; Brzoska, Michael; Brauch, Hans Günter; Link, Peter Michael; Schilling, Janpeter (Eds.): **Climate Change,Human Security and Violent Conflict: Challenges for Societal Stability** Hexagon Series on Human and Environmental Security and Peace, vol. 8 (Heidelberg – Dordrecht – London – New York: Springer, 30 April 2012). 900 pages

6.15. Climate Change, Human Security & Violent Conflict: Challenges for Societal Stability



- Climate change is becoming a focal point of security and conflict research and poses challenges to the world's structures of policymaking and governance.
- This handbook explores empirical and theoretical links between climate change, environmental degradation, human security, societal stability and violent conflict that could trigger cascading events and critical tipping points in climate-society interaction.
- Based on an extensive analysis of the securitization discourse, various conflict constellations are assessed, including water scarcity, food insecurity, natural disasters and mass migration.
- The security risks of climate are discussed in detail with regard to regional climate hot spots in Africa, the Middle East, Asia and the Pacific. Constructive approaches are examined for improving climate security through capacity-building for sustainable peace and cooperative policies leading to local and global governance structures.

6.16. Climate Change, Human Security & Violent Conflict: Challenges for Societal Stability



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- Part 1: Introduction. –
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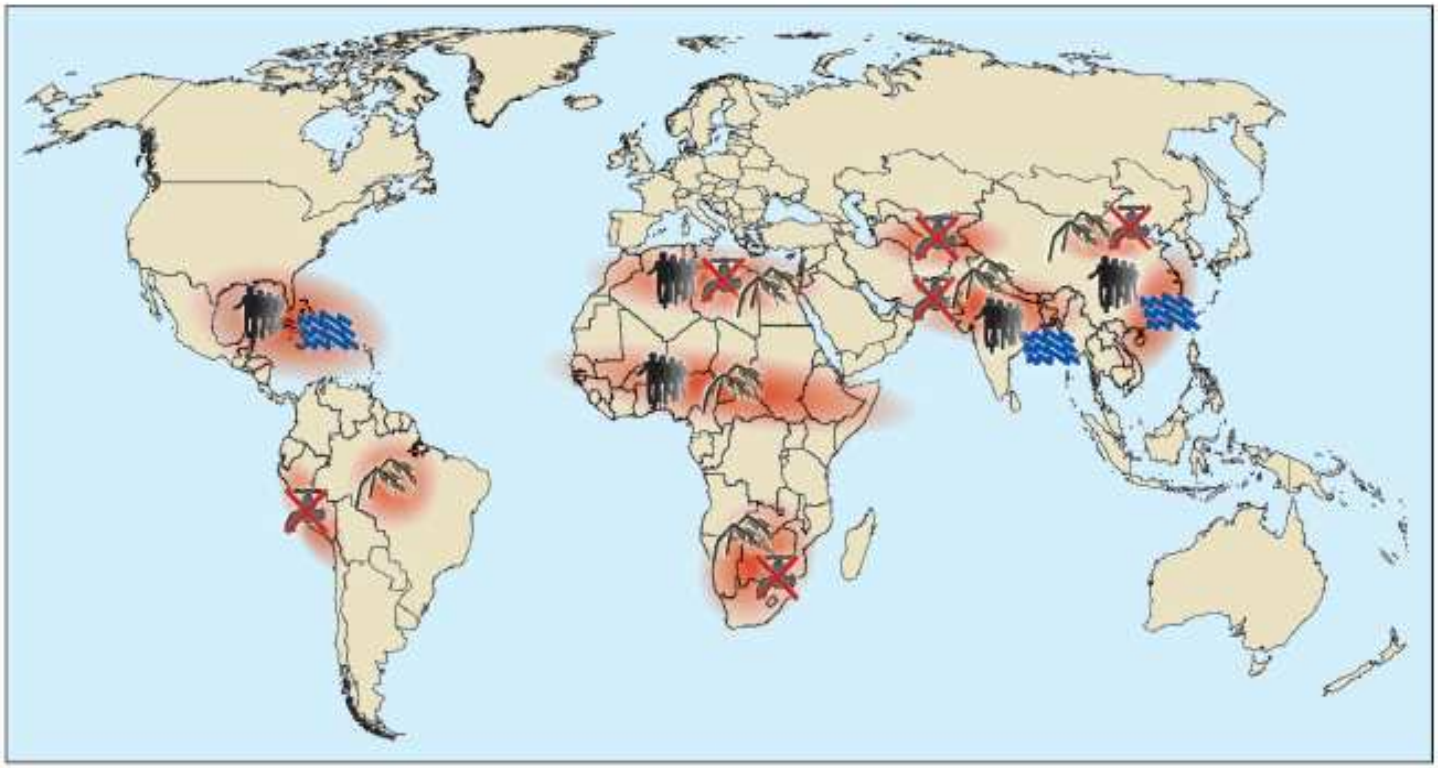
- Part III: Climate Change and the Securitization Discourse. –
- Part IV: Climate Change and Migration. – Part V: Climate Change and Security in the Middle East.
- Part VI: Climate Change and Security in Africa. –
- Part VII: Climate Change and Security in Asia and the Pacific. –
- Part VIII: Improving Climate Security: Cooperative Policies and Capacity-Building
- Part IX: Conclusions and Outlook

7. Global Climate Change Hotspots & Conflict Constellations

Figure 4.7: Regional hotspots and security risks associated with climate change. **Source**: WBGU (2008: 4). Reprinted with permission.

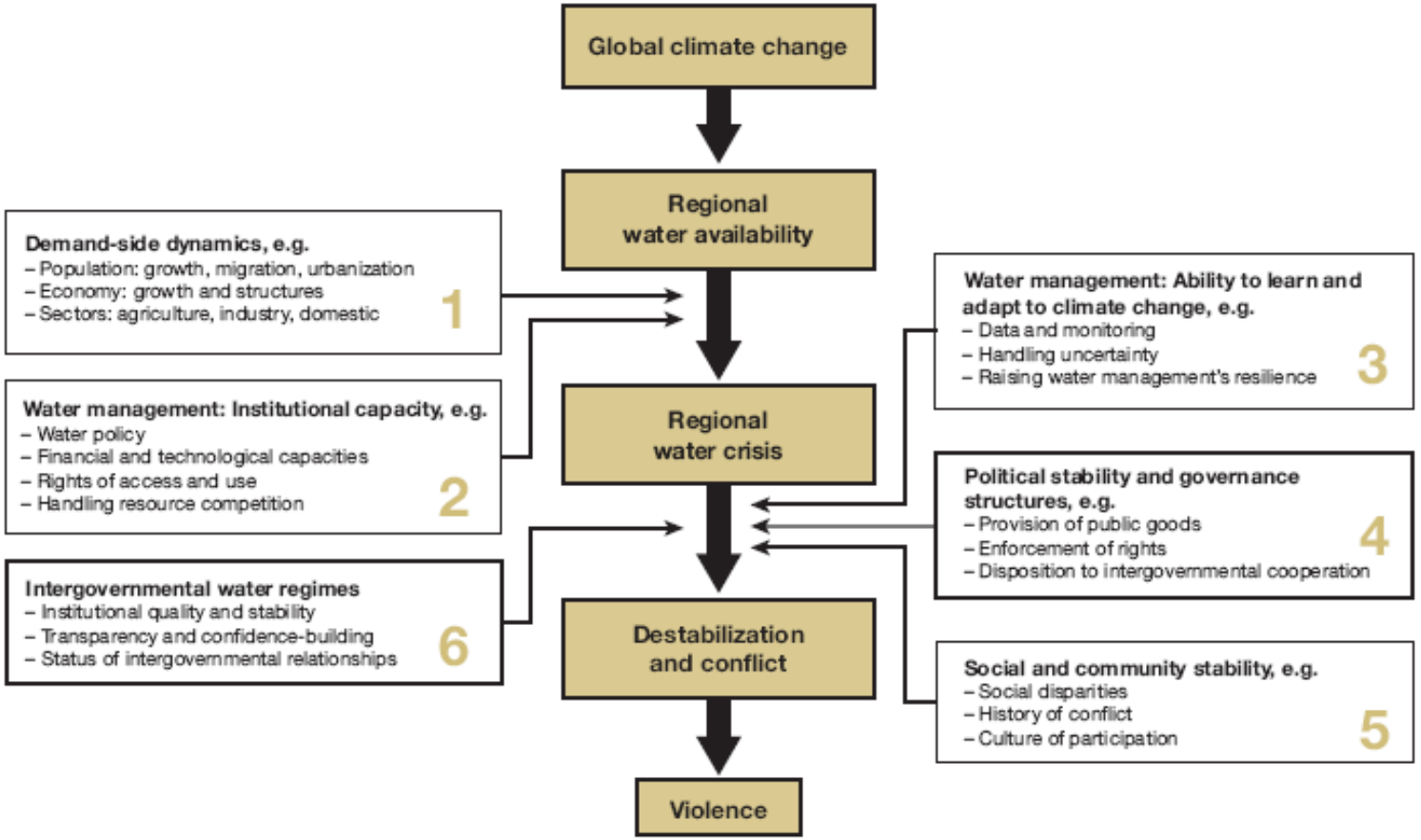


Security-related challenges in MENA region: Water scarcity to rise due to demand increase and supply decline

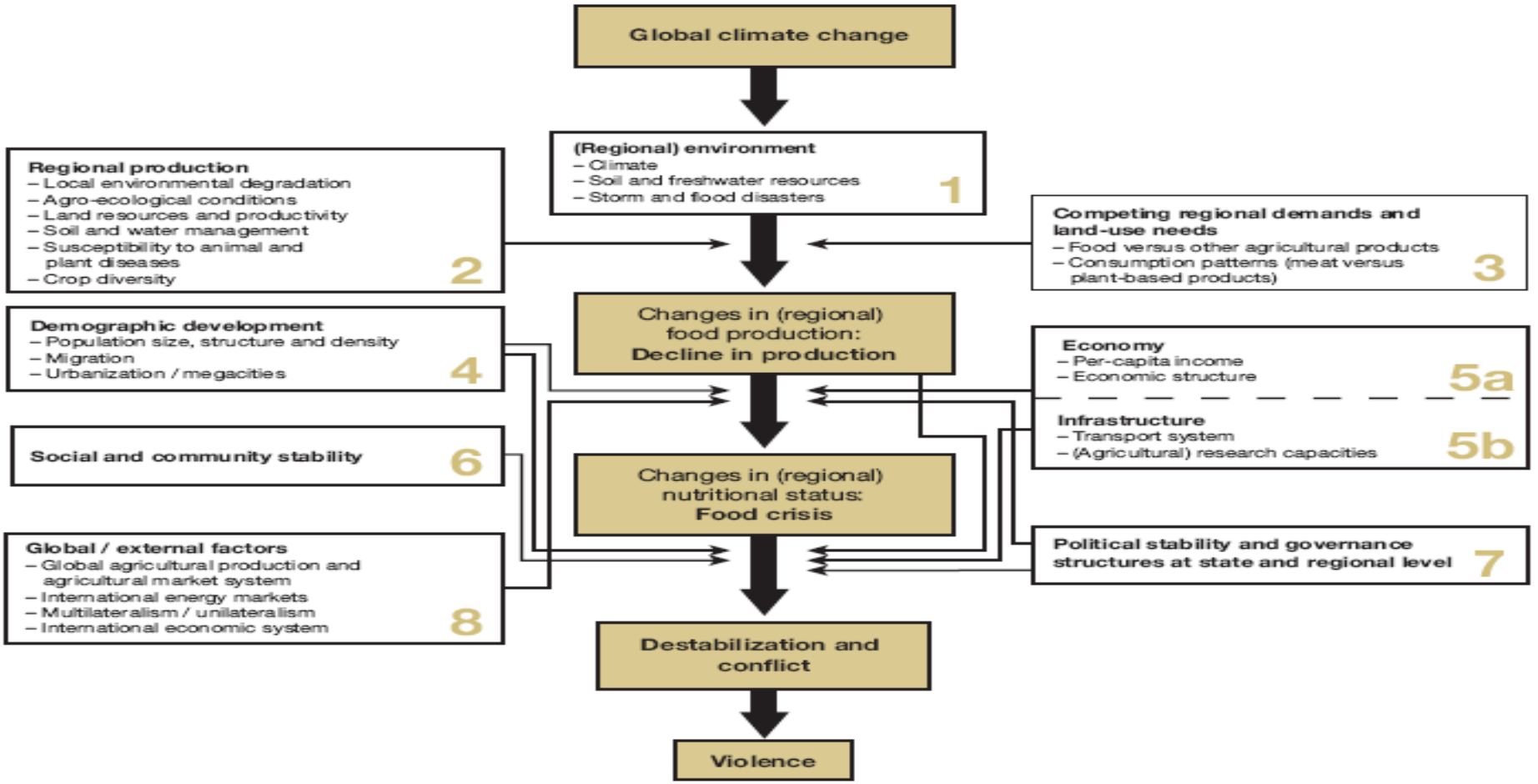
Rising food deficits

Rising environmentally induced migration

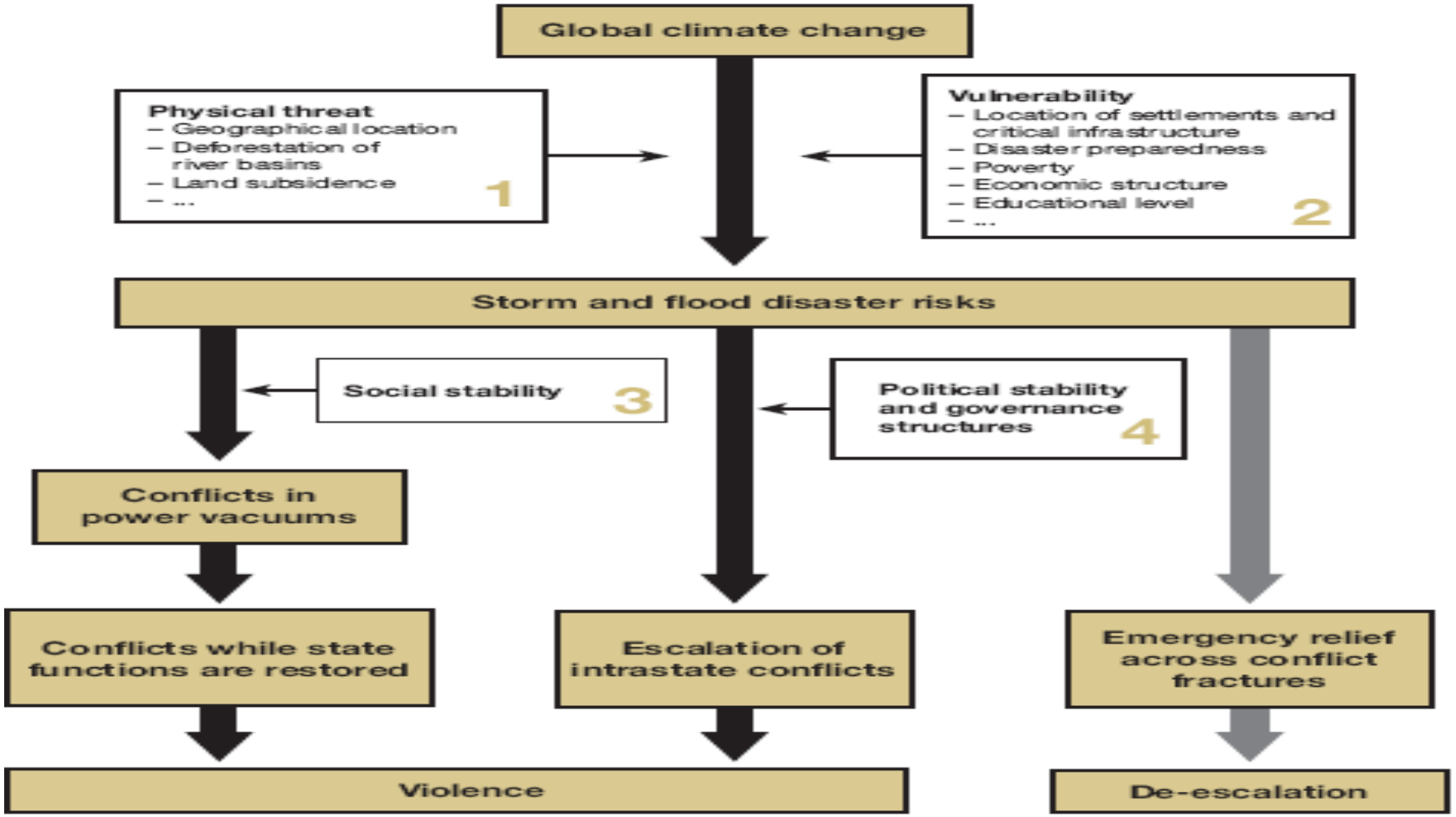
7.1. Conflict constellation Climate-induced degradation of freshwater resources

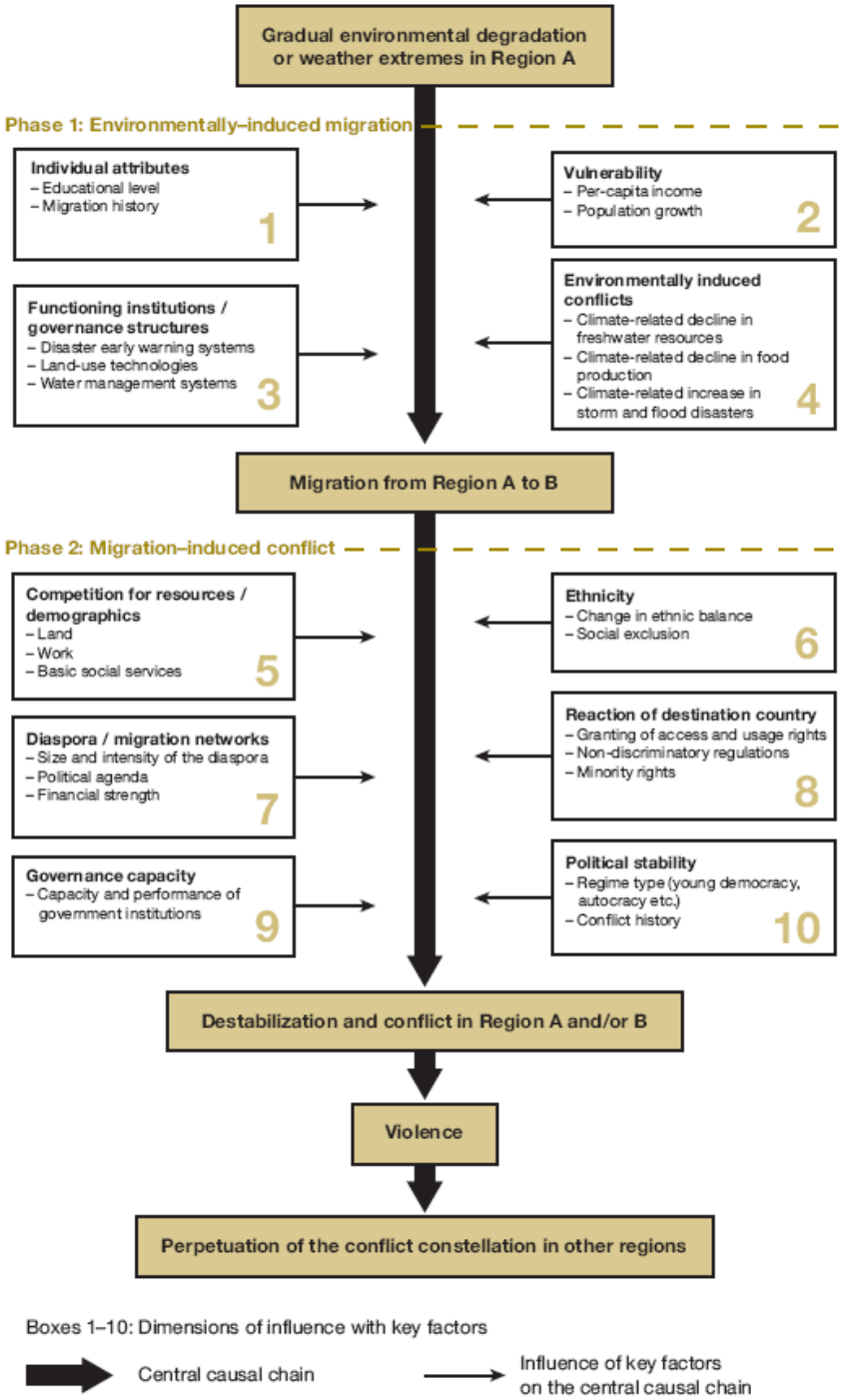


7.2. Conflict Constellation Climate-induced Decline in Food Production



7.3. Conflict Constellation Climate-induced Increase in Storm & Flood Disasters





7.4. Conflict constellation "Environmentally-induced migration"

- **IOM (2007): Environmental migrants are persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad.**
- **Migrants as a cause of conflict: if? Where? How?**

7.5. Addressing the Climate Paradox

- Overcoming the ‘Climate Paradox’ in North America requires a deliberate climate leadership of EU countries & a sustained willingness to unilaterally implement their climate reduction goals and the different roadmaps for 2050.
- Overcoming the ‘climate paradox’ requires a gradual replacement of the thinking and action in terms of ‘business as usual’ towards multiple sustainability transitions in all sectors of society, economy and also in the political realm.
- To move to a ‘Fourth Sustainability Revolution’ (FSR) requires major changes in the dominant culture & way of life, in societal, economic & political worldview of citizens & mindset of leaders, but also in governance to curb the influence of political money on the behavior of the elected representatives of the people.

7.6. Overcoming the Dominant Worldview

- The proposed new scientific revolution (Clark/Crutzen/Schellnhuber 2012) and the need for a new paradigm shift towards sustainability necessitate to gradually overcome the dominant worldview of the people and mindset of the political leadership.
- In international relations, severe crises have often become a driving force for learning, innovation & change, as the response of Nixon & Kissinger to the Vietnam War, or Gorbachev's efforts to save the socialist model by initiating a new thinking and reforms from the top.
- Implementing a sustainability transition with increasing energy efficiency reduces energy costs and enhances the competitiveness of European products. It may also reduce the dependence on fossil imports and thus the involvement in resource conflicts over the control of fossil energy resources

8. Perspectives of and Relevance for Cambodia, Canada, US, Denmark, Myanmar, Bhutan and South Korea

- Countries with legally binding climate change reduction obligations under the Kyoto Protocol
  - US: did not ratify
  - Canada: withdrew a year ago
  - Denmark: remained a medmber, pioneer in wind power
- Countries without Climate change reduction obligations under the Kyoto Protocol:
  - South Korea
  - Cambodia
  - Myanmar
  - Bhutan

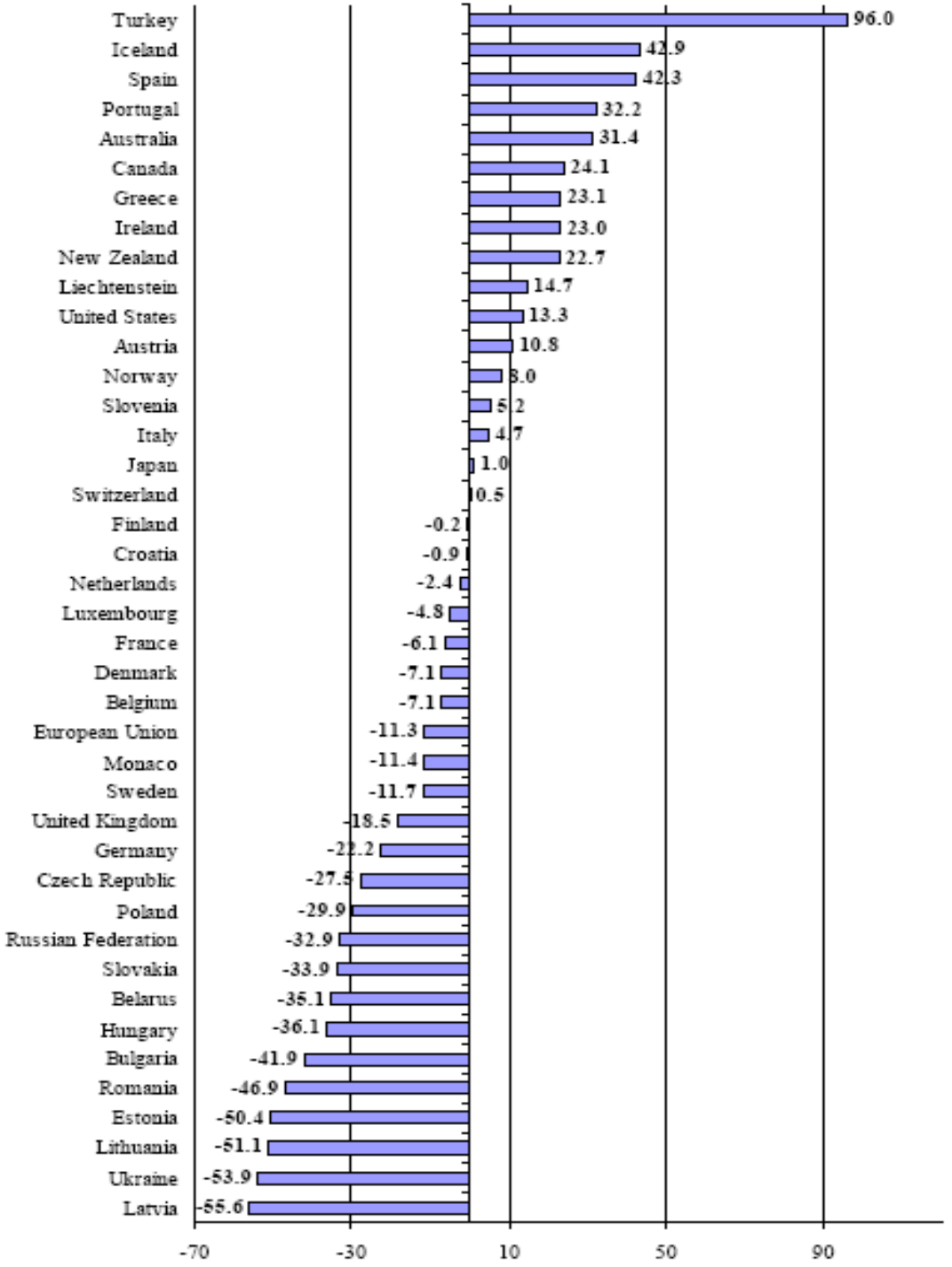
8.1. GHG Reduction Implementation Gap

QELRO, Kyoto Protocol

- EU countries: -8%
- Canada: -6%
- USA: - 7% (no party KP)
- Denmark:-8%(2009:-7.1%)
- Australia: +8%

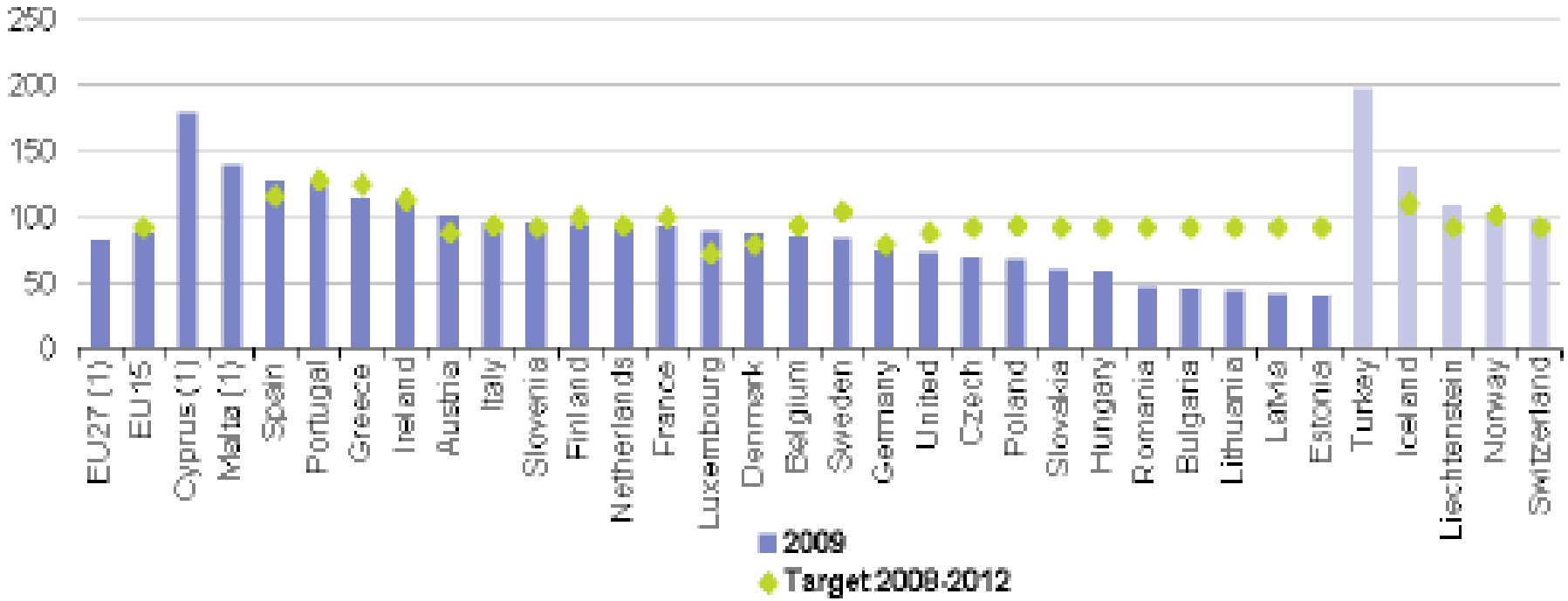
Changes in GHG Emissions: Annex I Part., 1990–2008 (exc. [incl.] LULUCF (%).

- EU countries:-11.3 [-11.3]
- Canada: + 24.1 [+33.6]
- USA: +13.3 [+15.3]
- Japan: +1% [-0.2]
- Australia: +31.4 [+33.1]
- Turkey: +96.0 [101.1]



8.2. Implementing Legal Obligations & Policy declarations: EU (Germany, UK, France, Italy

Greenhouse gas emissions and targets per country (Index Kyoto base year = 100):
Source: Eurostat: Climate change statistics (June 2011); at: <



(1) No target under the Kyoto Protocol (1990=100).

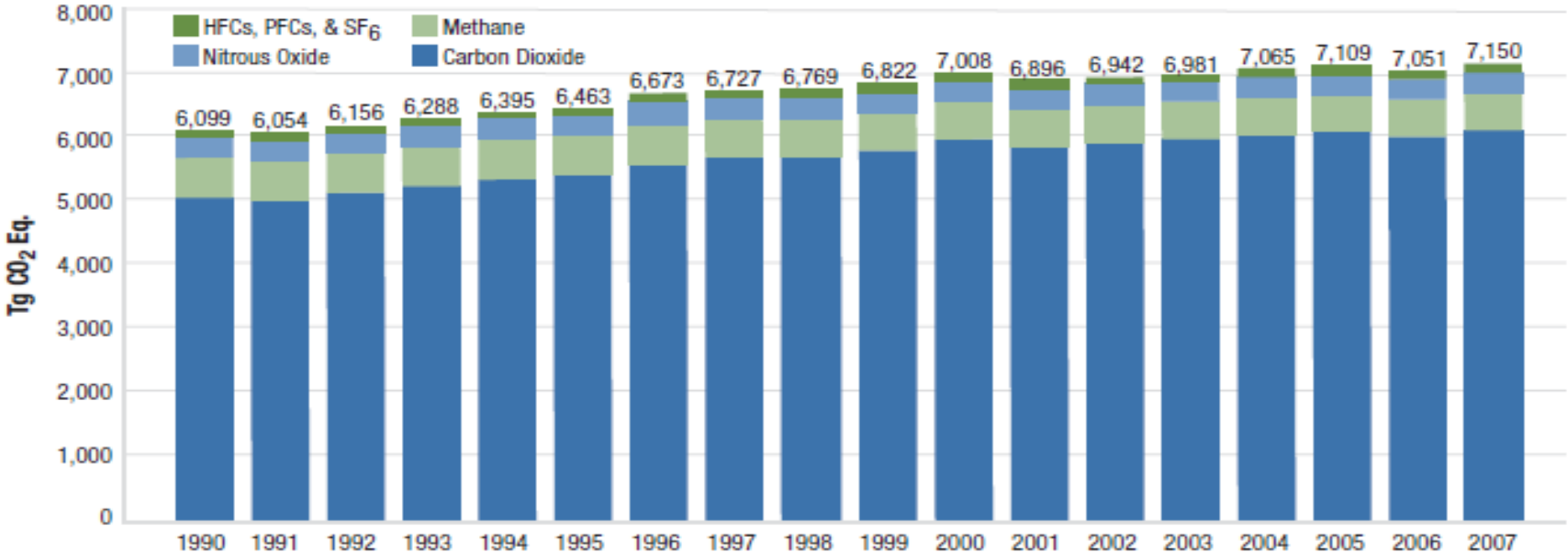
Source: Eurostat (tsien010), European Environment Agency, European Topic Center on Air and Climate Change

8.3. Climate Policies of NAFTA Countries: US Performance

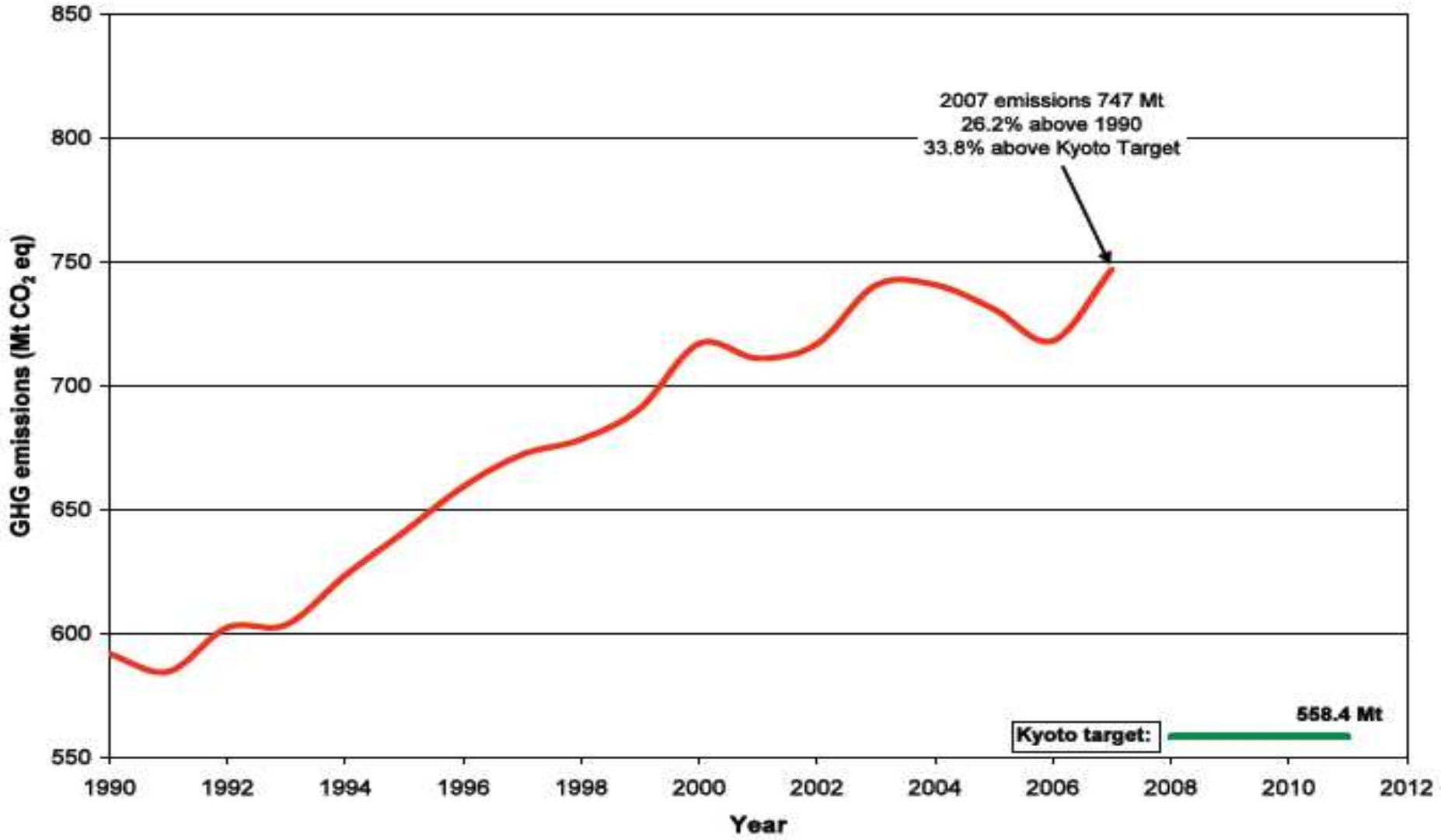
- **President Obama:** The threat from climate change is serious, it is urgent, and it is growing. Our generation's response to this challenge will be judged by history, for if we fail to meet it—boldly, swiftly, and together—we risk consigning future generations to an irreversible catastrophe (CAR 2010).

Figure 3-1 **Growth in U.S. Greenhouse Gas Emissions by Gas: 1990–2007**

In 2007, total U.S. greenhouse gas emissions rose to 7,150.1 Tg CO_2 Eq., which was 17 percent above 1990 emissions, and 0.6 percent above 2005 emissions.



8.4. Climate Policies of NAFTA Countries: Performance of Canada



8.5 Change of CO2 Emissions (1971-2009) and projections up to 2030

Countries	CO_2 emissions: Sectoral Approach in mill, tonnes (IEA 2011)					% change 1990-2009	CO_2 emission per cap. (UNDP 2011)		CO_2 emissions projections (IEA)			
									% of global total			
	1971	1980	1990	2000	2009		Tonnes (2008)	Average annual growth % 1970/2008	2007	2020	2020	2030
G-8	**With GHG reduction obligations under the Kyoto Protocol**											
1) USA	4 291.3	4 661.6	4 868.7	5 698.1	5 195.0	6.7%	17.3	-0.6	20	16		
2) Canada	339.4	426.9	432.3	532.8	520.7	20.4%	16.4	0.1				
3) Japan	758.8	880.7	1 064.4	1 184.0	1 092.9	2.7%	9.5	0.7				
4) Germany	978.6	1 055.6	950.4	827.1	750.2	-21.1%	9.6					
5) UK	623.5	571.1	549.3	523.8	465.8	-15.2%	8.5	-0.8				
6) France	431.9	461.4	352.3	376.9	354.3	0.6%	6.1	-0.9				
7) Italy	292.9	359.8	397.4	426.0	389.3	-2.0%	7.5	0.8				
8) Russia			2 178.8	1 505.5	1 532.6	-29.7%	12.1		6	5		
G-20	**With GHG reduction obligations under the Kyoto Protocol**											
9) EU-27			4 051.9	3 831.2	3 576.8	-11.7%			14	11		
10)Australia	144.1	208.0	260.1	338.8	394.9	51.8%	19.0	1.3				
G-20	**Without GHG reduction obligations under the Kyoto Protocol**											
11) Turkey	41.4	70.9	126.9	200.6	256.3	102.0%	3.9	3.2				
12) South Korea	52.1	124.4	229.3	437.7	515.5	124.8%	10.6	5.0				
13) Mexíco	97.1	212.1	264.9	296.6	399.7	50.9%	4.4	1.8				
14) China	809.6	1 419.8	2 244.1	3 077.2	6 877.2	206.5%	5.2	4.6	21	27		
15) India	200.2	283.3	582.3	972.5	1 585.8	172.3%	1.5	3.8	4	6		
16) Brazil	91.1	180.3	194.3	302.8	337.8	73.9%	2.1	2.0				
17) South Africa	173.8	214.5	254.7	298.2	369.4	45.0%	8.8	0.7				
18) Argentina	83.1	95.9	100.4	139.0	166.6	66.0%	4.8	0.9				
19) Indonesia	25.1	68.8	142.2	264.0	376.3	164.7%	1.8	4.8				
20) Saudi Arabia	12.7	99.1	158.9	252.4	410.5	158.4%	17.2	2.1				
									65	65		

8.5. Countries without Climate change reduction obligations under the Kyoto Protocol

- **South Korea**
  - National communications: 1998, 2003, 20.3.2012
  - Emission increase: 1990-2009: +124.8%, 10.6 t/per
- **Cambodia:**
  - National communications: 8.10.2002
  - Emission increase: no data (IEA 2011 CO2 Highlights)
- **Myanmar**
  - National communications: none
  - Emission increase: +154.7%
- **Bhutan**
  - National communications: 2 (13.11.2000 and 28.11.2011)
  - Emission increase: no data (IEA)

9. Two Alternative Visions: Hobbesian Business-as Usual vs. Sustainability Revolution & Decarbonizat.

- Humankind at **turning point of earth history**: in **Anthropocene** human interventions into earth system contributed to **anthropogenic global environmental** (soil, water, biodiversity) and **climate change**
  - **Linear projections of physical effects of GCC** (temperature, precipitation, SLR, natural hazards) may trigger societal impacts:migration, crises & conflicts
  - **Nonlinear (chaotic) tipping points** in the climate system are possible that may have significant impacts.
- **Two different visions & strategies:**
  - Business as usual (economic, political, military): old mindset
  - Alternative vision & strategy: change in worldview, mindset, culture and govenance

9.1. Alternative perspectives & visions:
Business-as-usual vs. Sustainability Transition

Oswald Spring and Brauch (2011) argued that:

- **Vision of business-as-usual with minimal reactive adaptation & mitigation strategies** will most likely increase the probability of a 'dangerous climate change' or catastrophic GEC with linear and chaotic changes in the climate system & socio-political consequences that represent a high-risk approach.
- To avoid these consequences the **alternative vision and sustainability perspective requires a change in culture** (thinking on the human-nature interface), **worldviews** (thinking on the systems of rule, e.g. democracy vs. autocracy and on domestic priorities and policies as well as on interstate relations in the world), **mindsets** (strategic perspectives of policy-makers) and new forms of **national and global governance**.
- Alternative vision of a **new fourth 'sustainability revolution**': radical change in culture, worldview, mindset and participative governance in the thinking and action on sustainability laying out an alternative development path with a total transformation of productive and consumptive processes aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.

9.2. Alternatives: Business-as-usual or Sustainability Transition?

- M**indset of 'business-as usual'** and the **cornucopian vision** are mental obstacles that restrained political willingness toward long-term transformation of economic, social & political system.
- Radical climate skeptics portrayed climate change as a major threat to the American way of life and jobs. Ultra conservative climate skeptical movements to attack & delegitimize the IPCC contradict the American optimism in scientific progress.
- The necessary long-term transformation and the sustainability transition (Grin/Rotmanns/Schot 2010) require in the USA and Canada a fundamental change of their dominant worldview, consumerist culture, values, belief systems, and of the attitudes & behavior of the people and fundamental transformation of the energy system aiming at a progressive decarbonization.
- This challenges powerful sectors of the economy, the interests of business groups and also of the trade unions representing these old economic sectors.

9.3. Two Opposite Visions

Anthropocene Two Ideal Type Future Visions:

- ***Business-as-usual*** where economic & strategic interests & behaviour prevail leading to a major crisis of human-kind, in inter-state relations and destroying the Earth ('security' & 'market first' scenarios, UNEP 2007)
- The need for a ***transformation*** of global cultural, environmental, economic (productive & consump-tive patterns) and political (on human and interstate) relations ('sustainability first' scenario, UNEP 2007). **Fourth Sustainability Revolution** or **Sustainability Ttransition**: Climate change as a **threat minimizer**.

9.4. Alternative Vision

- The alternative sustainability perspective requires a change in *culture* (thinking on the human-nature interface), ***worldviews*** (thinking on the systems of rule, e.g. democracy vs. autocracy and on domestic priorities and policies, interstate relations), ***mindsets*** (strategic perspectives of policy-makers) and new forms of national and global *governance*.
- This alternative vision refers to the need for a "**new paradigm for global sustainability**" (Clark/Crutzen/Schellnhuber 2004), for a "transition to [a] much more sustainable global society", aimed at peace, freedom, material well-being and environmental health. Changes in technology and management systems alone will not be sufficient, but "significant changes in governance, institutions and value systems" are needed, resulting in a fourth major transformation after "the stone age, early civilization and the modern era". These alternative strategies should be "more integrated, more long-term in outlook, more attuned to the natural dynamics of the Earth System and more visionary"

9.5. Two Alternative Strategies

Both visions refer to different coping strategies :

- Vision of ***business-as-usual*** suggests primarily techni-cal fixes (such as geo-engineering, increase in energy efficiency or renewables), defence of economic, strate-gic and national interests with adaptation strategies that are in the interest of and affordable for the ‘top billion’ of OECD countries.
- Alternative vision of **comprehensive transformation** a ***sustainable perspective*** has to be developed and implemented into effective new strategies and policies with different goals and means based on global equity and social justice.

9.6. Fourth Sustainability Revolution

- 2nd vision for a *transformation* of global cultural, environmental, economic (productive and consumptive patterns) and political (with regard to human & interstate) relations
- In the alternative vision of a comprehensive transformation a *sustainable perspective* has to be developed and implemented into effective new strategies and policies with different goals and means based on global equity and social justice.

9.7. Coping Strategies: Business-as-Usual

- **Instant Response: Discredit the message & attack the messenger: 2009: Attack on IPCC**
- **Coping with Climate Change Impacts:**
  - **Market will provide means** for coping with physical climate change effects: **Washington neoliberal consens.**
  - **Military Protection:** Adjust military strategies, mis-sions and tools to be able to operate under conditions of dangerous climate change („militarization"): **Hobbesian**
  - **Develop the technologies:** Geo-engineering schemes, strategy of energy independence: **Cornucopian**
- ***Business-as-usual*** in a **Hobbesian world** where economic and strategic interests and behaviour prevail leading to a major crisis of humankind, in inter-state relations and destroying the Earth as the habitat for humans and ecosystems putting the survival of the vulnerable at risk.
- **No Need for a Sustainability Revolution**

9.8. Four Knowledge-based Concepts of for Alternative Vision

- Key concepts of the alternative vision of a new fourth 'sustainable revolution' are a radical change in *culture*, *worldview*, *mindset* and *participative governance* in the thinking and action on sustainability laying out an alternative development path with a total transformation of productive and consumptive processes aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.
- This lays out an alternative development path with a **total transformation of productive and consumptive processes** aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.

9.9. Coping Strategies: Business-as-Usual

- **Instant Response: Discredit the message & attack the messenger: 2009: Attack on IPCC**
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  - **Develop the technologies:** Geo-engineering schemes, strategy of energy independence: **Cornucopian**
- **No Need for a Sustainability Revolution**

9.10. Business-as-Usual: Hobbesian World

- *Business-as-usual* in a **Hobbesian world** where economic and strategic interests and behaviour prevail leading to a major crisis of humankind, in inter-state relations and destroying the Earth as the habitat for humans and ecosystems putting the survival of the vulnerable at risk.
- ***Cornucopian perspectives*** prevail that suggest primarily technical fixes (geo-engineering, increase in energy efficiency or renewables), defence of economic, strategic and national interests with adaptation strategies that are in the interest of and affordable for the 'top billion' of OECD countries in a new geopolitical framework, possibly based on a condominium of a few major countries.
- This vision with minimal reactive adaptation and mitigation strategies will increase the probability of a '**dangerous climate** the climate system & socio-political consequences what is a high-risk approach.

9.11. Policy Response – Four Actors: State, Society, Economic Sector, Knowledge

- Key actors for development and implementation are:
  - **States:** initiate, fund and implement strategies, policies & measures for a fourth sustainability revolution
  - **Society** (parties, interest & pressure groups, NGOs, lobbyists): public awareness, discourse, social movements for sustainability transformation
  - **Economic sector & business community:** develops and offers technical and economic solutions
  - **Knowledge** (generation & education): source for innovation

9.12. Role of Knowledge

- The fourth sustainability revolution must be knowledge-based!
- The great transformation of the industrial revolution relied on new innovative scientific and technological knowledge that is either the result of inventions or resulted in new innovations.
- Despite its already widely accepted objectives and the many viable low-carbon technologies already available to us, the transformation is a joint quest.
- Research and education are tasked with developing sustainable visions, in co-operation with policy-makers and citizens; identifying suitable development pathways, and realising low-carbon and sustainable innovations.
- The WBGU recommends intensified refocusing of national and international research towards the Great Transformation, and the provision of the requisite funds. The relevant scientific findings must also be made accessible and understandable to allow people to accept the change and to participate democratically in the transformation.

9.13. Four Knowledge-based Concepts of for Alternative Vision

- Key concepts of the alternative vision of a new fourth 'sustainable revolution' are a radical change in *culture*, *worldview*, *mindset* and *participative governance* in the thinking and action on sustainability laying out an alternative development path with a total transformation of productive and consumptive processes aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.
- This lays out an alternative development path with a **total transformation of productive and consumptive processes** aiming at equity, social justice, and solidarity with the most vulnerable and marginal people and the poorest countries.

9.14. Worldview of Scientists

- *Worldview* concept evolved from ‘Weltanschauung’ that refers to a wide world perception and to a **framework of ideas and beliefs through which individuals interpret the world &** interact with it.
- A comprehensive worldview includes the **fundamental cognitive orientation of a society, its values, emotions, and ethics** through which a society or a group interprets the world in which it interacts.
- Worldview is the **fundamental cognitive, affective, & evaluative presupposition a group of people makes about the nature of things**, & which they use to order their lives.
- The **‘construction of integrating worldviews’** begins from fragments of worldviews offered to us by different scientific disciplines and various systems of knowledge to which different perspectives contribute in the world’s cultures.
- **Gert Krell** used this concept for distinguishing among several macro-theoretical approaches in international relations.

9.15. Mindset of Policymakers

- The concept of *mindset* includes a fixed mental attitude or disposition that predetermines a person's responses to and interpretations of situations by referring to different patterns of perceiving and reasoning.
- Fisher used it as 'cultural lenses' that filter our view of and reaction to the world. With regard to the 'Fourth Sustainable Revolution' this concept refers to a discussion of a post-carbon society, where solidarity, equity, and social justice are the key drivers instead of the maximization of profits and the destruction of the Earth without thinking of the next generations or of the collapse of ecosystems.
- **Ken Booth** mindsets "freeze international relations into crude images, portray its processes as mechanistic responses of power and characterize other nations as stereotypes". Many mindsets have survived the fundamental global contextual change of 1989/1990, as the Cold War "exists as our living past, and it exerts a powerful presence by being both remembered and forgotten in complex ways".

9.16. Addressing Obstacles to ST: Overcoming Old Mindsets & World Views

- Oswald Spring and Brauch (argued that in the Anthropocene humankind is confronted with opposite ideal-type visions:
  - Business-as-usual in a Hobbesian world where economic and strategic interests and behaviour prevail, leading to a major crisis for humankind in inter-state relations that will destroy the Earth as the habitat for humans and ecosystems and put the survival of the vulnerable at risk (see the ‘market first’ and ‘security first’ scenarios of UNEP 2007).
  - The need for a transformation of global cultural, environmental, economic (productive and consumptive patterns), and political (with regard to human and interstate) relations (see the ‘sustainability first’ scenario of UNEP 2007).

10. Evolution of debate on sustainability transition: Climate Change as a Trigger

- The emerging scientific debate on ‘sustainability transition’ addresses the many scientific, societal, economic, political, and cultural needs to reduce GHG emissions.
- These cannot be achieved simply by legally binding *quantitative emission limitation and reduction obligations* (QELROs), as in the framework of the Kyoto Protocol (1997).
- These have failed to achieve their proclaimed stated aims during the past two decades because of a lack of political will and capability to implement these legal obligations and policy declarations.
- A continuation of the prevailing world view and ‘business-as-usual’ mindset may lead to ‘dangerous’ (+4□℃ world) or even ‘catastrophic’ (4-6°world) climate changes and major huma n catastrophes during this century if the global temperature should rises by 4-6□℃ above the pre-industrial average by end of the 21st century.

10.1. Emerging Scientific ST Discourse

- **2001: Amsterdam conference** on Earth Systems Science (ESSP)
- 2004: Clark/Crutzen/Schellnhuber provided conceptual context for the **Dahlem Workshop on "Earth Systems Science and Sustainability" (2003),** where they pointed to "the need for harnessing science and technology in support of efforts to achieve the goal of environmentally sustainable human development in the Anthropocene"
- **2005: KSI started** to work on Sustainability transition (John Grin, co-chair)
- **2009:Amsterdam Conference on Sustainability** Transition resulted in Sustainability Transition Research Network (STRN)
- **2010: Routledge Series on Sustainability Transitions** was launched
- **2011: Elsevier: Environmental Innovation and Sustainability Transition**
- **2011: Oswald Spring/Brauch: Fourth Sustainability Revolution (FSR)**
- **2011: Brauch/Dalby/Oswald Spring: A Political Geoecology for the Anthropocene**
- **2011: WBGU. Report: A Social Contract for Sustainability**
  - We are currently witnessing the emergence of a new scientific paradigm that is driven by unprecedented planetary-scale challenges, operationalized by transdisciplinary centennium-scale agendas, and delivered by multiple-scale co-production based on a new contract between science and society.
- **2012: Third STRN Cofnerence in Copenhagen: 30-31 August 2012**
- **2013: Fourth STRN Conference in Zürich in June**

10.2 Emergence of the Scientific & Policy Debates on 'Sustainability Transition'

- Scientific discourse in natural sciences on **earth systems analysis (ESA)** or **earth systems science (ESS),** '**sustainability science' (SuS**) involving natural and social sciences, and on **ST**, primarily in the social sciences.
- **Policy debate** has addressed proposals for a **global green deal** and **green growth**, that are increasingly been being addressed by inter- and supranational organizations, such as the **UN, UNEP, OECD, and the EU.**
- **Since 2009**, ***Sustainability Transitions Research Network*** **(STRN)** has focused on "persistent sustainability problems in such sectors as **energy, transport, water and food" from the perspective of "various scientific communities" on the ways**
  - in which society could combine economic & social development with reduction of its pressure on the environment. A shared idea among these scholars is that due to the specific characteristics of the sustainability problems (ambiguous, complex) incremental change in prevailing systems will not suffice. There is a need for transformative change at the systems level, including major changes in production, consumption that were conceptualized as 'sustainability transitions
- **Routlege Series, vol. 1: „seek to understand transitions dynamics, and how and to what extent they may be influenced."** …The transition to sustainability has to compete with other developments, and it is uncertain which development will gain the upper hand. … The authors … closely address the need for transitions, as well as their dynamics and design. Thereby they concentrate on historical cases as well as on contemporary examples.

10.3. Discourse on Sustainability Transition

- **Research & Dialogue Project: Sustainability Transition and Sustainable Peace (STSP)**
- *Second debate* is partly policy driven, by debate on a **green economy** that has been launched by **UNEP, OECD and by different DGs of the European Commission.**
- ***Scientific discourse*** on sustainability transition evolved
  - after conference in Amsterdam (2009); Lund (2011), Copenhagen (2012)
  - *Sustainability Transitions Research Network* (STRN)
  - journal on *Environmental Innovation and Sustainability Transition* (EIST)
  - *Routledge Book Series in Sustainability Transitions* (since 2010).
- **This new project tries to link this emerging debate with the experience of international relations and *environment, security, development and peace* (ESDP) studies by addressing possible impacts of both alternative policy trends for international peace and security.**

10.4. Seven Dimensions of Emerging Debate on Sustainability Transition

In a talk at the first sustainability transition and sustainable peace (STSP) workshop I distinguished among 7 dimensions of ST

<http://www.afes-press-books.de/html/sustainability_workshop_overview.htm>

1. **Temporal Dimension of Sustainability Transition**
2. **Spatial Dimension of Sustainability Transition**
3. **Scientific Dimension of Sustainability Transition**
4. **Societal Dimension of Sustainability Transition**
5. **Economic Dimension of ST**
6. **Political Dimension of ST**
7. **Cultural Dimension of ST**

10.5. Temporal Dimension of Sustainability Transition

- As with the previous “great transformation” (Polanyi 1944) caused by the industrial revolution, the debate on ‘sustainability transition’ refers to another long-term but a far more comprehensive transformative change. With regard to the “policy implications of sustainability transitions”, Voß et al. (2009) pointed to a long- term orientation of policy frameworks and argued that
  - Sustainability transitions typically span over several decades and are therefore at odds with the usual spans of attention prevalent in political processes …
  - In order to support long-term structural shifts, policies have to interact with many transformative changes as they unfold. Long-term policy design thus needs to be flexible, adaptive and reflexive (Voß et al. 2009)

10.6. Spatial Dimension of Sustainability Transition

Within the evolving discourse on ST, proposal of a spatial dimension by Coenen, Benneworth & Truffer was more limited; they argued that

- an explicit analysis of the geography of transitions contributes to transition literature in various ways.
  - Firstly it provides a **contextualization and reflection on the limited territorial sensitivity** of existing transitions analysis. The majority of empirical studies have been conducted in a small number of countries, primarily the Netherlands, UK or Scandinavia, with an increasing interest in Asian countries.
  - Secondly, it explicitly acknowledges and **investigates a variety of transition pathways**.
  - Thirdly, it encompasses not only greater emphasis but also better conceptual & theoretical devices for understanding the **international, trans-local nature of transition dynamics**.

More recently, Coenen and Truffer (2012: 1) claimed that

- environmental innovations & sustainability related initiatives have received increasing attention in the recent **economic geography and regional studies** literature.
- In how far **sustainability concerns might also lead to fundamental transformations in technologies**, **industries and life styles** (so-called sustainability transitions) has however found much less resonance.
- **Sustainability transitions have been in the focus of scholars from the field of innovation studies.**
- **However, these approaches mostly disregarded spatial aspects of sustainability transitions until recently.**

10.7. Scientific Dimension of Sustainability Transition

- **Development of new scientific & technological knowledge is crucial for initiating processes for multiple transitions towards sustainability.**
- **1999: US National Academy of Science (NAS): in a report: Our Common Journey: A Transition Toward Sustainability noted that "many human needs will not be met, life-support systems will be dangerously degraded, and the number of hungry and poor will increase".**
- **The NAS also argued that "a successful transition toward sustainability is possible over the next two generations" but that this would require "significant advances in basic knowledge, in the social capacity and technological capabilities to utilize it, and in the political will to turn this knowledge to action" (NRC 1999: 160).**
- **Lourdes Arizpe was a coauthor**

10.8. Societal Dimension of Sustainability Transition

- **Political, economic, and societal strategies for 'sustainability transition'** cannot be implemented against **the wishes, values, and preferences of the people concerned**. Such a long-term and global transformative change requires not only **'hard' changes in the systems of production, energy, and transportation**, as well as in human settlements and habitats, but also many '**soft' changes in human values, belief systems, world views, and mindsets**.
- The societal dimension of the scientific discourse on sustainability transition has so far focused on the **changes needed in human values, perception, and behaviour** that will result in **new lifestyles, ways of life, and patterns of consumption**. These goals have been promoted by leading scientists, by certain policymakers, and by religious and social movements such as the simplicity movements that call for a simple lifestyle with no negative effects on nature.

10.9. Societal Dimension of ST

- **WBGU (2011: 67)** argued "the necessary transformation into a low-carbon society already corresponds to some of the prevalent attitudes and value systems in many of the world's countries ... Secondly, the transformation can be viewed as a **positive factor in the sense of increasing subjective life satisfaction for large parts of the population**". WBGU noted
  - terms **'values', 'attitudes' and 'opinions**' have different meanings in psychology, sociology and political sciences (see Häcker/Stapf 1994). For the most part, it is assumed that attitudes are based on values, and that these attitudes influence people's behavior, even if research (Eckes/Six 1994) assumes that there is no particularly close connection between attitudes and behavior. In this report, the WBGU uses these terms as follows:
  - **1. Personal and cultural values:** Cultural values refer to something that has evolved socio-culturally, something that exists independent of individuals. Personal values, refer to the subjective concepts of desire and specific value orientation. Personal values describe the individuals' relatively stable preferences with regard to different values.
  - **2. Attitudes:** Contrary to the rather abstract 'values' and 'value systems', attitudes relate to certain objects, people (groups), ideas and ideologies, or specific situations (Häcker/Stapf 1994). Attitudes represent evaluation and action tendencies with regard to attitude objects, and are usually stable in the medium-term. They are therefore neither long-term value systems, nor short-term intentions.
  - **3. Opinions:** Are generally considered as verbalization of attitudes and values.

10.10.From Value to Behavioural Change

- For a **behavioural change towards a sustainability transition**, a temporal change in **public preferences and attitudes is insufficient**. A fundamental change in **human behaviour** is needed that will lead to major changes in **lifestyles and in preferences and patterns of consumption that will result in a lower ecological footprint** and in a reduction of individual carbon emissions.
- However, this **cannot be achieved by changes only on the demand side**; it also requires a **major change on the supply side** with regard to **green and renewable energy systems, public and low carbon transport systems, and products with a much lower carbon footprint.**
- **New social movements and political parties** may contribute to creating both awareness of and positive political frameworks for a change in the lifestyles and preferred way of life for a majority of the people.
- **Changing the 'soft' human & societal side of 'sustainability transition' may be as difficult if not more difficult than changing socio-technological framework on which most of the research has so far focused.**
- While new **scientific results & new publicly shared knowledge does not change values, attitudes, preferences, and behaviour**,
- changes of soft factors require **simultaneous changes in hard factors of economic system, in processes of production. consumption, & policy process.**

10.11. Economic Dimension of ST

- **Energy sector: 2/3 of GHG emissions, changes in land use (deforestation & agriculture): 1/4 of GHG emissions.**

WBGU (2011: 109) has argued that:

- Fundamental **changes in the technological development paths of all countries are necessary** in order to provide the chance of achieving elemental development goals like access to food, clean water, basic health care, or poverty reduction, to the 50% of the population so far denied this chance, whilst remaining within the planetary boundaries. …
- Central elements of the transformation into a sustainable and **climate-friendly society are the comprehensive decarbonization of the energy system**, as well as significant **energy efficiency improvements**, particularly **in end-use efficiency**.
- The **determined realization of a climate compatible development path** is possible. … These include … **facilitating economic development through universal access to safe and modern energy, improving long-term supply security, and a de-escalation of international conflicts with regard to energy resources**, positive effects on employment in structurally weak regions, and the reduction of many of the current systems' negative effects on the environment …
- **Building the transformation-relevant technology and infrastructure requires substantial investments, and the development of new financing concepts and business models for energy services.** In the long run … these initial investments will be more than compensated by … **reduced fuel and security costs, less damage to the environment, and avoidance of costs associated with adapting to climate change, and with the consequences of climate change** (WBGU 2011: 109).

10.12. ST of other Economic Sectors

- Besides the fundamental transformation of the energy sector, the WBGU Report (2011) proposed **an intensification of policies of sustainable production and consumption and major initiatives in buildings, living, and land use planning, in mobility and communication, and in food;**
- these will require both **climate-compatible agricultural management and a change in dietary habits**.
- Initiating & intensifying the move towards a low-carbon society and economy requires major investments & new and additional financial resources, such as **phasing out fossil energy and agricultural subsidies, taxation of international transport and international financial transactions, and development assistance and financing via the carbon market**.
- Besides the **decarbonization of world economy**, "**overcoming energy poverty**" and "to provide universal access to modern, clean and safe energy in the form of electricity or gaseous energy carriers by 2030" together present the second major challenge for a sustainable energy transition.

10.13. Sustainable Transformation of Cities

- Initiating **sustainable transformation in cities** with the highest energy growth potential can become a major force of innovation and investment in new infrastructure. This **requires new governance actors** (Corfee-Morlot et al. 2009) who can reduce traffic by a “spatial integration of urban functions”, thus “achieving a high quality of life for inhabitants”.
- Further, **“energy infrastructure integration** (CHP technology, heating & cooling systems, smartgrids, electromobility, etc.) can benefit considerably from the spatial density” (WBGU 2011).
- While **“land-use systems cannot become completely emissions-free”,** nevertheless “a significant contribution from land use” is needed, including “stopping deforestation and switching to sustainable forest management, as well as the promotion of climate-friendly agriculture and dietary habits” (WBGU 2011:173).

10.14. Political Dimension of ST

- **Political dimension of 'ST' was extensively discussed & many approaches, analysis, & proposals were made**
- **Grin (2010: 223)** suggested that the transition to sustainable development can **no longer rely on centralized government institutions of political administrative steering**, given the "more prominent role of the interactions between the state, market, and society".
- **Grin argued that a governance perspective "allows us to consider transition management, strategic niche management and interrelated processes in the real world", for three reasons:**
  - First, it contributes to the *historical contextualization of the transition* towards a sustainable society in late modernity. …
  - Second, a **governance perspective emphasizes not only the nature of transitions** as profound changes in both established patterns of action and the structure in which they are embedded, but also how these changes in practices and structure in a particular domain are influenced by long-term, societal trends exogenous to that domain. …
  - **Transforming established patterns of action and their structural context is bound to run into resistance and inertia.** … This suggests a third positive feature of a governance perspective: it pays attention to dealing with the politics intrinsic to transitions and systems innovation.

10.15. Political Dimension of ST

- **Focusing primarily on structural change in innovative systems, Coenen & Truffer (2012: 6) argued in ST research**
- **explorative scenarios, experimentation and learning … constitute important elements in specific policy programs**.
- reflexive policy framework that built on work of **Constructive Technology Assessment** has become known as **Strategic Niche Management.** …
- Other contributions have worked **out foresight based scenario methods** to identify **potential development trajectories for entire countries, sectors, technological fields or firm level strategic planning processes**
- A more encompassing policy framework has later been developed in the Netherlands as **Transition Management**, … comprises five main elements:
  - (1) Establishing a **transition arena** (i.e. a broad constituency of representatives from industry, politics, and society that accompany the ongoing planning and implementation process),
  - (2) developing a **vision of a future sustainable sector structure**,
  - (3) identifying **pathways towards these future states** by means of backcasting methods,
  - (4) setting up **experiments for particularly interesting development options**
  - (5) **monitoring, evaluation and revisions**.

10.16. Studies on Political Dimension of ST

- Studies by **Grin (2010) and in ’t Veld (2011**) link the intensive scientific debate on global environmental & climate governance to process of ST.
- From a US perspective, John C. Dernbach (2008) discussed legal aspects of the process of “Navigating the U.S. Transition to Sustainability”
- Several studies addressed the governance aspects and perspectives of sustainability transition (Loorbach 2007), and governance aspects have also been discussed prior to the Rio+20 summit.
- But hardly any proposals regarding international governance for ST, e.g. the upgrading of UNEP from a programme to a specialized agency, were adopted in the outcome document in Rio in June 2012.

10.17. Cultural Dimension of ST

- While many studies on ST have focused on issues of technological innovation in relevant industrial sectors, especially on energy, and on governance aspects, the societal and cultural dimension has been less prominent.
- In the social and political sciences there has been an intensive debate on postmodern values and value changes and on the changers of attitudes and preferences towards sustainability .
- The WBGU used values as “a shared perception of something worth striving for”, where cultural values refer “to something that has evolved socio-culturally, something that exists independent of individuals”. It stated that “attitudes relate to certain objects, people (groups), ideas, and ideologies, or specific situations”.
- In contrast to short-term intentions and long-term value systems, attitudes “represent evaluations and action tendencies with regard to attitude objects, and are usually stable over the medium-term”, while opinions are understood as “verbalizations of attitudes and values”.

10.18. Studies on Cultural Dimension of ST

- The **WBGU** (2011: 77) argued, based on Leiserowitz et al. (2006), that there are **various barriers that prevent "value systems from impacting on behavior**, at both individual and social or structural level" and that a change in behaviour requires "a material and cognitive basis".
- A transition towards sustainability is structurally constrained by the **prevailing path dependence** and the extensive high-carbon infrastructure and its political and electoral influence on decision-makers in parliaments and in the executive sector.
- **Analysis of the so-called soft aspects of sustainability transition, e.g. of the constraints, obstacles, and barriers to changes in opinion, attitudes, value systems and behavior, requires the expertise of sociologists, social psychologists, and anthropologists, but it also needs political scientists who can analyse cognitive perceptual and evaluative barriers created by the established traditional world views of scientists and the mindsets of policymakers**

10.19. Political Urgency & Research Agenda: Sustainability Transitions & Sustainable Peace Project

Glooming Prospects for Post-Kyoto Regime: Paralysis

- Prospects for Post-Kyoto climate regime at COP 17 in Durban were low
- At present it becomes increasingly unlikely to realize the 2°C world
- Probability of 'dangerous climate change' increases dramatically
- This increases the probability that thresholds in the climate system may be crossed, that tipping points may be unleashed, triggering cascading processes'

Business-as-usual paradigm prevails in politics & media

- In light of global financial crisis, the sense of urgency for proactive climate action has declined since 2009 prior to Copenhagen (COP 15)
- The US government is paralyzed due to ideological confrontation within the US Congress and between the Senate & the House
- Lack of urgency among BASIC countries to accept commitments.

10.20. Discourse on Sustainability Transition: Four Hypotheses

- We are in the midst of a **global transition in earth history** from the '**Holocene', to the 'Anthropocene'** that began with human interventions into the **earth system** and that has resulted in a rapid increase in GHG emissions in the atmosphere.
- The **impacts of the grand transformations** of the first and second industrial revolution have resulted in a complex global environmental change and in anthropogenically-induced climate change, besides as well as the increasing destruction of the biodiversity. natural climatic variations. This has resulted in an exponentially growing accumulation of GHG in the atmosphere this has also affected almost all environmental services.
- The **societal impacts** of four physical effects of 'anthropogenic global climate change' and of biodiversity loss may result in **major international, national, and human security dangers**.
- **Since 2005 an alternative discourse on 'sustainability transitions' or on 'transitions to sustainable and resilient development' has begun to evolve**. It addresses new directions in the 'study of long-term transformative change' that also needs to focus on resilient societies.

10.21. WBG (2011): New Social Contract for a „Global Transformation“

- **WBGU explains reasons for a ‚post fossil-nuclear metabolism‘ concluding that the transition to sustainability is achievable.**

A New Social Contract

- **Transformation into a sustainable society requires a modern framework for nine billion people for living with each other, and with nature: a new Contrat Social.**
- **This virtual social contract relies on each individual’s self-concept as a responsible global citizen. This contract is also a contract between generations.**
- **Science plays an essential role here, as for the first time in history, a profound transition is not caused by imminent necessity, but by precaution and well-founded insight. In this respect, the social contract also represents a special agreement between science and society.**
- **A new culture of democratic participation through the appointment of ombudsmen … to ensure the protection of future-oriented interests. Sustainability-oriented approach can be given a secure, firm footing through the inclusion of ‘climate protection’ in the constitution as a national objective, and through establishing a climate protection law.**
- **A low-carbon transformation can only be successful if it is a common goal, pursued simultaneously in many of the world’s regions.**
- **Therefore, the social contract also encompasses new ways of shaping global political decision-making and cooperation beyond the nation state.**

10.22. Introduction: Goals, Objectives, Thesis and Structure

‘**Sustainability transition’ research has evolved since 2004:**

- Clark, Crutzen, Schellnhuber: ‘Science for Global Sustainability’ (2004).
- Dutch *Knowledge Network on Systems Innovation &Transition*
  - complex systems analysis,
  - socio-technological and a governance perspective”.
- Relies on research that has evolved since the 1990s when “innovation & technology scholars … started to address environmental innovation and sustainability transitions more explicitly:
  - *technological innovation systems approach* (TIS) and
  - *multi - level perspective* (MLP) approaches has contributed.
- ‘*Sustainability Transitions Research Network*’ (STRN, 2009/2010),
- ‘Routledge Studies in Sustainability Transitions’ (2010),
- Journal ‘*Environmental Innovation and Sustainability Transitions*’ (2011)
- WBGU Report on a ‘Social Contract for Sustainability’ (2011)

10.22. Two parallel discourses

- The parallel discourse on ‘sustainability transition’ addresses both the causes and impacts of GEC and GCC by facing & coping with both and avoiding the projected societal consequences of dangerous or catastrophic climate change and of possible tipping points in the climate system.
- From this perspective the goal of ‘sustainable development’ and the perspective on **‘sustainability transition’ refer to a much wider research agenda than the relatively narrow focus on environmental and technological innovations that is a primary focus of many researchers in the STRN.**
- The process of ‘transition’ refers to multiple long-term evolutionary and revolutionary transformative changes that point to five different historical times, with different transformative results
- These must be distinguished since they have different transformative results. We may address them with four hypotheses:

10.23. Climate Change & Sustainability Transition

- The emerging scientific debate on ‘sustainability transition’ addresses the many scientific, societal, economic, political, and cultural needs to reduce GHG emissions.
- These cannot be achieved simply by legally binding *quantitative emission limitation and reduction obligations* (QELROs), as in the framework of the Kyoto Protocol (1997).
- These have so far failed to achieve their proclaimed stated aims during the past two decades because of a lack of political will and capability to implement these legal obligations and policy declarations.
- A continuation of the prevailing world view and ‘business-as-usual’ mindset may lead to ‘dangerous’ (+4□℃ world) or even ‘catastrophic’ (4-6°world) climate changes and major huma n catastrophes during this century if the global temperature should rises by 4-6□℃ above the pre-industrial average by end of the 21st century.

10.24. Sustainability Transitions and Sustainable Peace Project (STSP)

- **Research & Dialogue Project: Sustainability Transition and Sustainable Peace (STSP)**
- *Second debate* is partly policy driven, by debate on a **green economy** that has been launched by **UNEP, OECD and by different DGs of the European Commission.**
- ***Scientific discourse*** on sustainability transition evolved
  - after conference in Amsterdam (2009); Lund (2011), Copenhagen (2012)
  - *Sustainability Transitions Research Network* (STRN)
  - journal on *Environmental Innovation and Sustainability Transition* (EIST)
  - *Routledge Book Series in Sustainability Transitions* (since 2010).
- **This new project tries to link this emerging debate with the experience of international relations and *environment, security, development and peace* studies by addressing possible impacts of both alternative policy trends for international peace and security.**
- **STSP was launched in September 2012 in Mexico (1st Workshop), 2nd workshop on 2 April 2013 at ISA in San Francisco)**
- **Goal: STSP Handbook by 2014 in the Hexagon Series**

10.25. Past Transitions & War/Peace

- **All three technical revolutions (longterm transformations):**
  - the first **agricultural revolution** (10.000 to 6.000 years ago),
  - the second **industrial revolution** (1750-1890/1914), and
  - the third revolution of **communication, transportation and information (CTI) technologies** (since 1890 or 1920) ('second industrial revolution') have resulted in a higher and more violent level of warfare and have thus impacted negatively on international peace and security.

This experience raises several new key research questions:

- Will the suggested fourth sustainability revolution lead to new multiple and potentially violent conflicts within and among countries? May the suggested sustainability transition in the energy sector reduce the potential of resource-related violent conflicts and wars?
- From a scientific and conceptual perspective, which strategies, policies and measures may be needed to combine the proposed process of a long-term transition of the scientific institutions and their new knowledge, of societies and the business community and economic sectors as well as new forms of governance with the goal of a sustainable peace?

10.26. Specific Goal of Workshop

- **This workshop combines four scientific issue areas and scientific discourses:**
  1. **Research on *consequences of policies on GEC and climate change*** that resulted in a deficient implementation of agreements (KP of UNFCCC) and of non-binding policy declarations of the G8 what represents a 'Climate Paradox'. This will increase the probability of a dangerous and catastrophic climate change. To avoid its consequences in science, & societal, economic and political realms, major changes in science, society, the business community & politics are needed. This has inspired several scientists to call for a new **'scientific revolution towards sustainability', a new 'Social Contract for Sustainability' or a 'fourth sustainability revolution'.**
  2. **Research that address the *consequences of global environmental change and climate change* on *international peace and security*, and the linkages between climate change and security**
  3. A third emergent research field in the social sciences deals with *theoretical and empirical approaches and strategies of a long-term transformative change towards a sustainable development*.
  4. In the context of these discourses a sustainable peace will also be addressed from the perspective of *human security*.
- **Based on the discussion of these multiple complex issue linkages new research questions & research fields are to be developed for a multidisciplinary oriented & policy relevant international social sciences and also for peace research.**

11. Energy Transition: Bottom-up vs. top-down

- Energy transition has started globally & accelerated since 2009: China major producer
- Energy transition in Germany: bottom-up
  - State set the legal framework (national renewables)
    - Electricity Feed-In Law
    - Renewable Energy Law (2000)
  - Customers: Investment in Wind and Solar Power
- Top-down: Macro Scale Proposals
  - Import of renewable electricity from the desert
  - As part of a co-development strategy between Europe and MENA Region

11.1. EU-27 Climate & Energy Policy Goals: GHG Reductions by 2020 & 2050

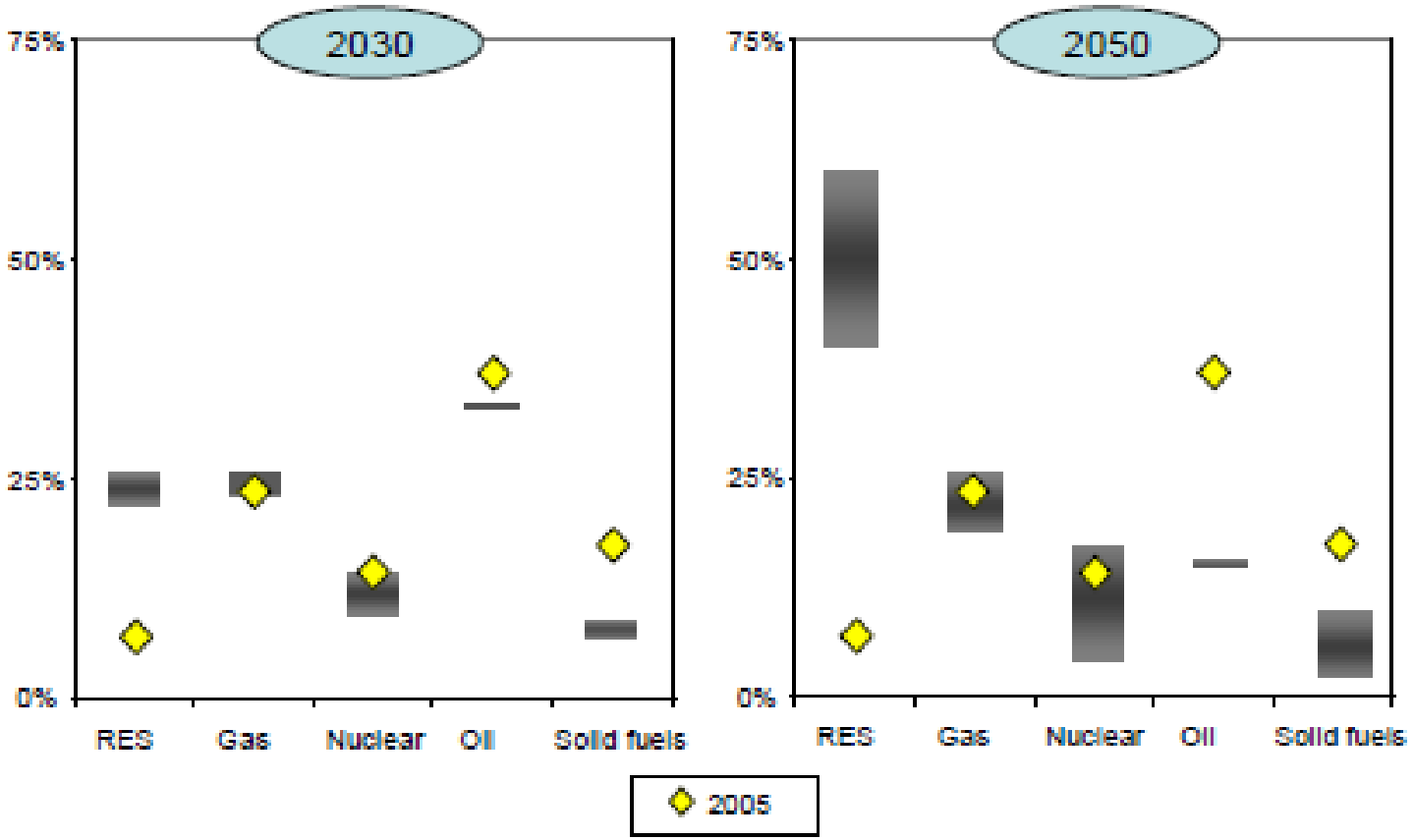
- Among EU-27 **Germany, UK, France & Italy: 54.9% of GHG** weighted emissions in CO2 equivalents who complied with their EU reduction targets.
- Among the 27 EU countries several laggards missed their reduction targets under Annex B of the KP and EU-15 'burden-sharing' approach, **Spain (+37.7/+11.8%), Portugal (+35.3/-3.0%), Ireland (+32.4/-0.8%), Greece (28.6/-10.5%);** their combined share of the EU-27 was 13.7% in 2009.
- EU-27 are the global leaders in implementing their commitments under KP.
- **In March 2007**, the European Council decided for a 20/20/20 target by 2020:
  - reduction in EU GHG emissions 20% cent below 1990 levels;
  - 20% of EU energy consumption to come from renewable resources;
  - 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.
- On 10–11 December 2009, the European Council offered to increase its emissions reduction to thirty per cent if other major emitting countries would commit to significant reductions under a global climate agreement.
- **On 15 December 2011 the European Commission (2011) released its Energy Roadmap 2050**

11.2. EU-27 Reduction Goal for 2050

- On 15 December 2011 the European Commission (2011) released its ***Energy Roadmap 2050***, according to which:
- The EU is committed to reducing greenhouse gas emissions to **80-95% below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group.** The Commission analysed the implications of this in its **'Roadmap for moving to a competitive low-carbon economy in 2050'.**
- **The 'Roadmap to a Single European Transport Area' focused on solutions for the trans-port sector and on creating a Single European Transport Area**.
- In this Energy Roadmap 2050 the Commission explores the challenges posed by delivering the EU's decarbonization objective while at the same time ensuring security of energy supply and competitiveness. It responds to a request from the European Council.
- **This requires a sustainable transition in energy sector.**

11.3. EU Decarbonization scenarios 2030 and 2050 (comp. with 2005 in %)

Graph 1: EU Decarbonisation scenarios - 2030 and 2050 range of fuel shares in primary energy consumption compared with 2005 outcome (in %)



11.4. Solar Thermal Technologies for Electricity Generation in the Deserts

Concentrating Solar Power Technologies:

- alternatives: a) Fresnel concentrators, b) parabolic trough (400-600 ℃), c) solar tower concept with surrounding heliostat field (1200 ℃, up to 50 MW), d) solar dish (for small applications up to 50 kW).





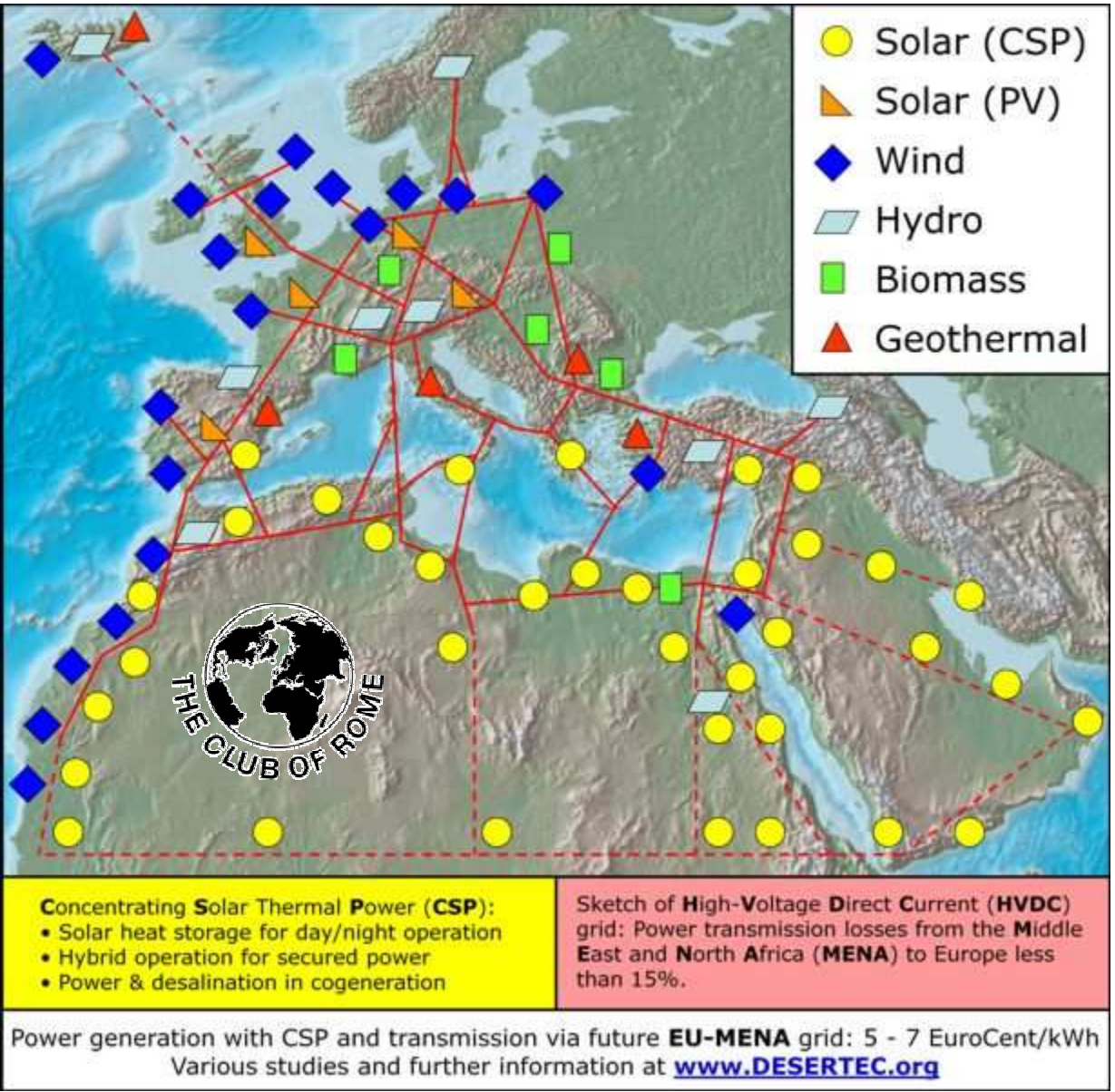



11.5. System of Solar Electricity Generation
SEGS, California, USA (354 MW, since 1985)
ANDASOL 1, Spain (50 MW, 7h storage, 2009)

11.6. IPCC SRREN Report (2011)

- According to the IPCC's (2011) **Special Report on Renewable Energy Sources and Climate Change Mitigation (SRREN)** and the WBGU's (2011: 119) assessment, "**the sustainable potential of renewable energies is fundamentally sufficient to provide the world with energy".**
- **According to IPCC's Summary for Policymakers (2011: 15):**
  - **"There are multiple pathways for increasing the shares of RE across all end-use sectors."**
  - **This applies specifically to the transport, building, and agricultural sectors and requires long-term integration efforts including investment in enabling infrastructure; modification of institutional and governance frameworks; attention to social aspects, markets and planning; and capacity building in anticipation of RE growth.**
  - Furthermore, integration of less mature technologies, including biofuels produced through new processes (also called advanced biofuels or next-generation biofuels), **fuels generated from solar energy, solar cooling, ocean energy technologies, fuel cells and electric vehicles, will require continuing investments in research, development and demonstration (RD&D), capacity building and other supporting measures.**

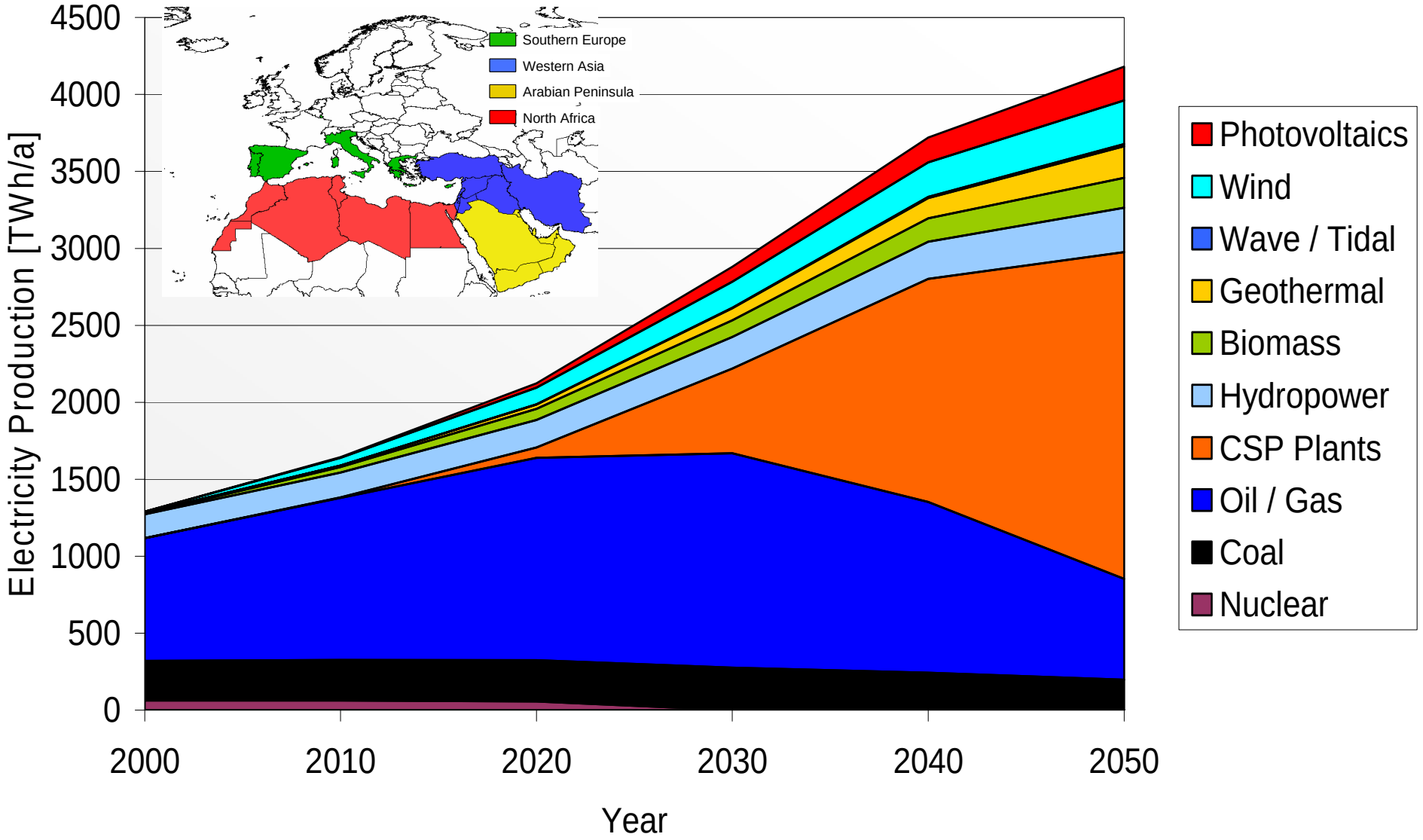
11.7. Mediterranean Renewable Energy Potential



Trans-Mediterranean **R**enewable **E**nergy **C**ooperation (**TREC**) is an initiative that campaigns for the transmission of clean power from deserts to Europe.

Since 2003 TREC has developed the **DESERTEC Con-cept**.

11.8. Annual electricity demand & generation within the countries analysed in the MED-CSP scenario



DESERTEC FOUNDATION

An initiative of

TREC
Clean Power from Deserts

11.9. Desertec Vision: An Intercontinental Mega Project

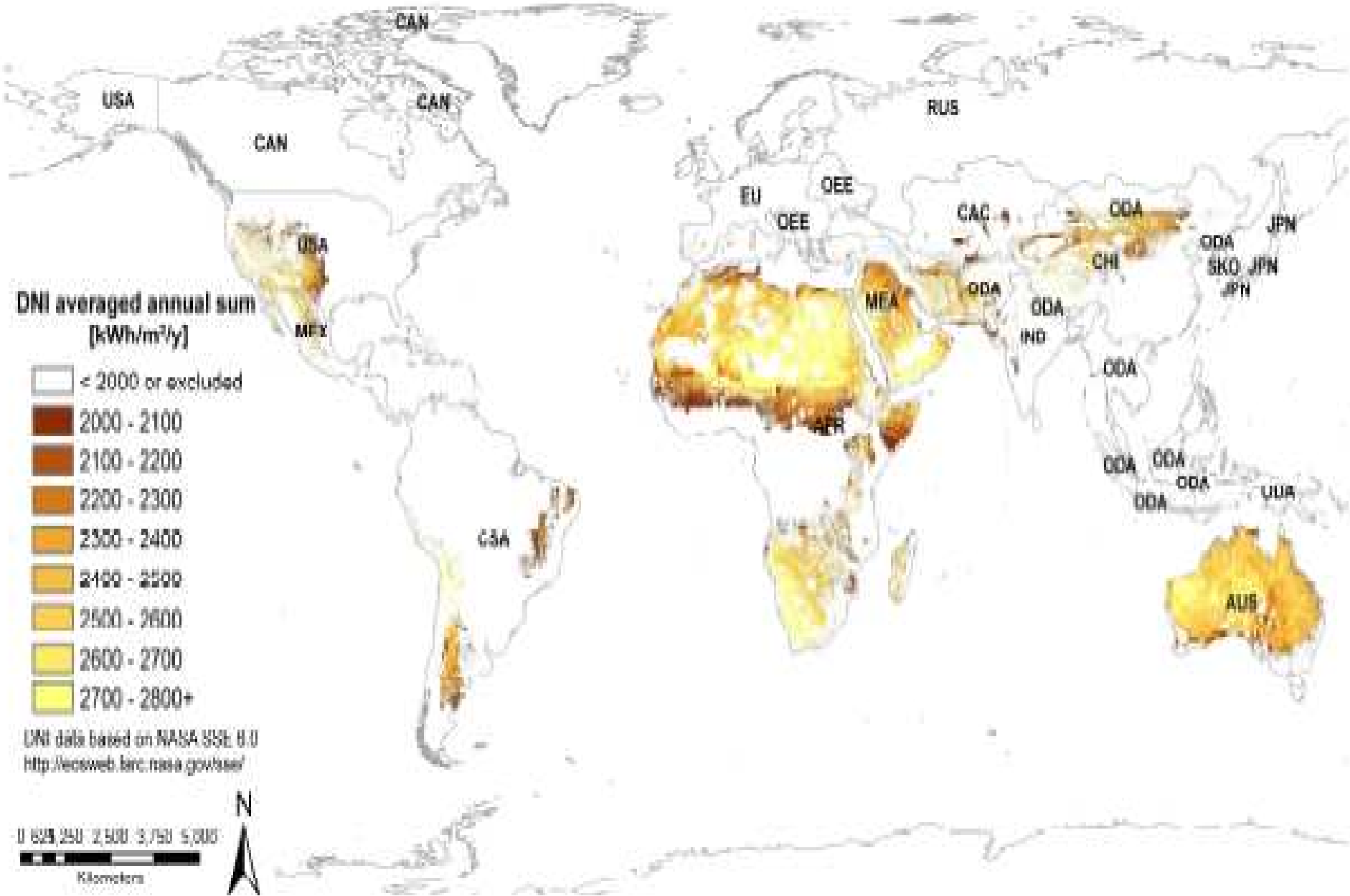
11.10. Desertec Concept

- A close cooperation between EU and MENA for market introduction of renewable energy and interconnection of electricity grids by high-voltage direct-current transmission are keys for economic and physical survival of the whole region. … The DESERTEC White Book describes a scenario of electricity demand and supply opportunities by renewable energy in the integrated EU-MENA region up to the middle of the century. Among the Dii's main goals are the drafting of concrete business plans and associated financing concepts, and the initiating of industrial preparations for building a large number of networked solar thermal power plants distributed throughout the MENA region. The initiative's clear focus on implementation is set out in the Dii Principles for all future Dii shareholders. Besides the business opportunities for the companies, there are other economic, ecological, and social potentials:
  - greater energy security in the EU-MENA countries;
  - growth and development opportunities for the MENA region as a result of substantial private investment;
  - safeguarding the future water supply in the MENA countries by utilizing excess energy in seawater desalination plants; and
  - reducing carbon dioxide emissions and thus making a significant contribution to achieving the climate change targets of the European Union and the German Federal Government

11.11. Desertec Role in Morocco

- Dii will not make any investments itself, nor will it build or operate any power plants. During the planning phase (until late 2012), a suitable framework for the long-term development of renewable energies will be set up to invest in generation plants and power grids. Dii will launch several reference projects to demonstrate the fundamental viability of the Desertec vision. In spring 2011, the Moroccan Agency for Solar Energy (Masen) and Dii signed a Memorandum of Understanding (MoU) concerning a reference project, and they jointly plan:
  - installed capacity: 400 MW solar thermal power station, 100 MW photovoltaic plant;
  - output: approximately 1.4 – 1.6 TWh of renewable energy;
  - export: eighty per cent to Europe, of which approximately 1 TWh of energy to Germany;
  - percentage of energy supplied locally: twenty per cent;
  - a contribution towards achieving the 2020 environmental protection objectives.

11.12. World Solar Potential



11.13. Conclusions: Coping with Global Environmental Change in the Anthropocene

1. Anthropogenic Global Climate Change since the Industrial Revolution (especially1960s) triggered a **change in Earth System from Holocene to the Anthropocene**
2. Global Environmental Change has become a **scientific, political and security threat, challenge or risk in the Antropocene**
3. **Limited progress has been achieved in climate policy**
4. **We are confronted with a climate paradox of some developed countries unwilling/unable to meet their legal commitments.**
5. **A continuation of business as usual will result in security consequencers of GEC and GCC**
6. **Alternative vision and strategy of a sustainability transition has still to be developed**
7. **Normative goal to achieve a sustainable peace with HS**

Thank you

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