Freie Universität Berlin

Otto-Suhr-Institut für Politikwissenschaft, WS 2010/2011

HS 15390 Climate Change Impacts for International, European, National & Human Security: Causal, Discourse, Scenario and Empirical Analyses of Hotspots

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UNITED NATIONS
UNIVERSITY
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Institute for Environment
and Human Security

AFES-PRESS

Seminar Plan (21.-23.2.1011)

Monday 21.2.2011, 8.00-18.00: Framing the debate: 4 schools/approaches

2. **8.00-10.00: Four key positions: dramatizers, opponents, sceptics, empiricists**
3. 10.00-12.00: **Causal analyses:** Models of interactions between the earth and human system
4. 13.00-14.30: **Discourse analyses** in international organizations: UN, EU, NATO, OSCE
5. 14.45-16.15: Discourse analyses of selected countries: USA, Germany or UK and India
6. 16.30-18.00: **Scenario analyses:** Studies of the EU Commission and US Nat. Int. Council (CIA)

Tuesday 22.2.2011., 8.00-18.00:Empirical analyses

7. **8.00-10.00: Empirical analyses: different approaches for the Holocene and Anthropocene**
8. 22.02., 10.00-12.00: Holocene: Collapse of high civilizations in Egypt, China and Mesoamerica
9. 22.02., 13.00-14.30: Climatic causes of massive 'Völkerwanderung' and of revolutions
10. 22.02., 14.45-16.15: Cases of extreme societal impacts of climate change in Anthropocene
11. 16.30-18.00: WBGU's four conflict constellations for analysing future climate change impacts

Wednesday 23.2., 8.00-18.00: Regional climate change impacts & hotspots

12. **8.00-10.00: Climate change impacts for small island developing countries (SIDS)**
13. 23.02., 10.00-12.00: Climate change impacts for Mediterranean, Middle East and North Africa
14. 23.02., 13.00-14.30: Climate change impacts for Sub-Saharan Africa (Sahel, Eastern and Southern Africa)
15. 23.02., 14.45-16.15: Climate change impacts for Central, South, South East or East Asia
16. 23.02., 16.30-18.00: Climate change impacts for Mexico, Central America and the Caribbean

Contents

1. **Climate change & security: emerging debate**

2. **Reconceptualization of Security**

3. **Climate Change and International Security**
   - **Climate Change: a Security Danger/Concern**
   - **Climate Change and National Security**
   - **Climate Change and Human Security**
   - **Climate Change and International Security**

4. **PEISOR model on nature human interactions** and for the analysis of climate change and conflicts as new security danger

1. Climate Change and Security –
an emerging policy and scientific debate

- **Climate change:** natural variability vs. anthropogenic change
  - A topic of the natural sciences (earth systems science & climatology)
  - Global warming in atmosphere: precondition of life on earth
  - Sea-level rise and temperature increase
  - Natural variability: warm and cold periods: migration and conflicts
  - Anthropogenic climate change: burning of hydrocarbons
  - Climate observations (1860-2008) and projections (2050-2100)
- **Security: discourse in the social sciences**
  - **A basic concept and a policy field:**
  - **Reconceptualizartion of security since 1990: contextual change**
    - **End of the cold war, globalization and global environmental change**
  - **Conceptual Innovation:**
    - **Risk society (Beck), social constructivism, theory of securitzation**
- **Three stages: climate change as a socio-political issue**
  - *Scientization* (since 1970s), *politicization* (1988), *securitzation* (2000)

1.1. Impacts of Climate Variability: Holocene (12.000 years b.p. to 1750 AD)

End of Roman Empire: massive people's movements : 1st phase, 300-500 AD, Germanic, Turkish & other peoples.
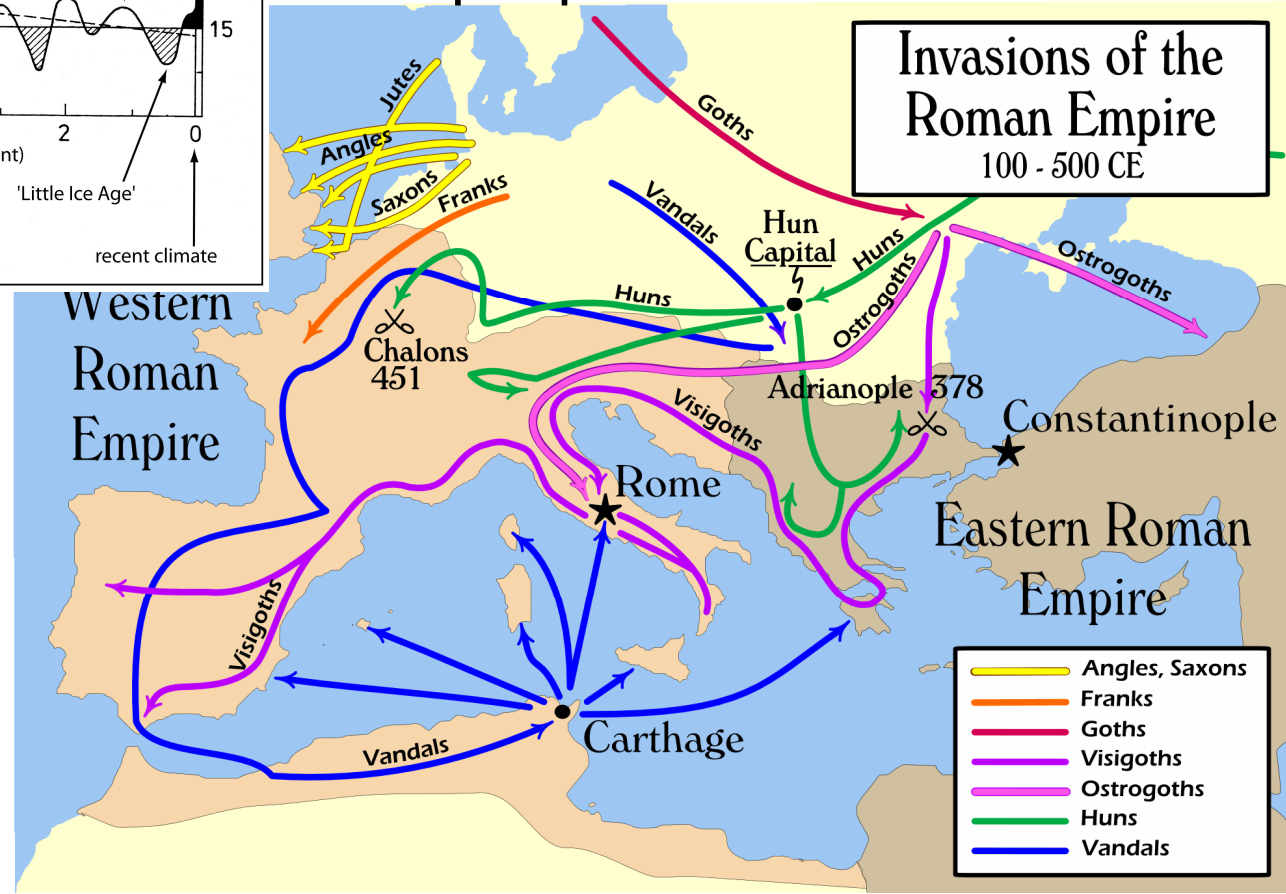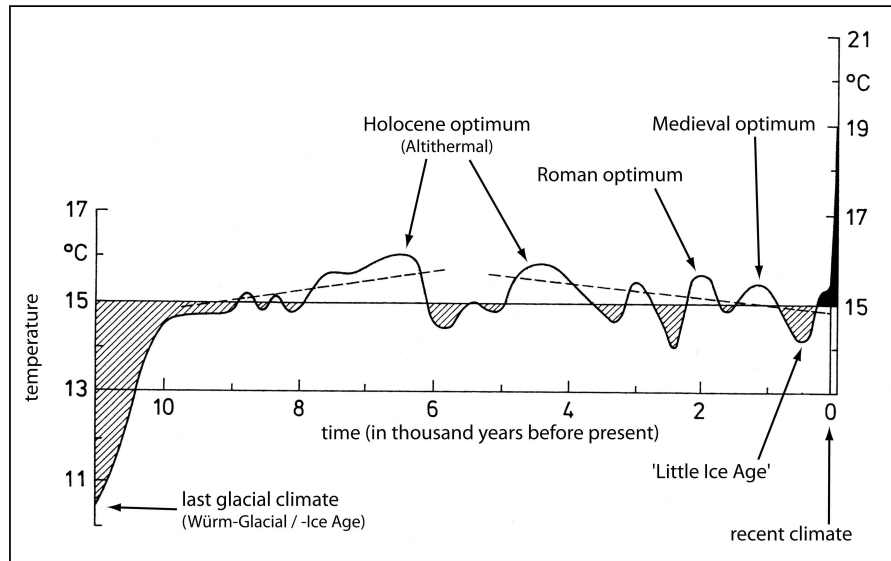
During **Holocene** era both **climate pessima** (cold periods) and **changes in precipitation patterns** and long periods **of drought** were major triggers for **several phases of massive people's movements**:

1.2. Anthropocene

Paul Crutzen,
Nobel Laureate for
Chemistry
Max Planck Institute
for Chemistry
Department
Atmospheric
Chemistry

- It … is more than appropriate to emphasize the **central role of humankind in the environment by using the term 'Anthropocene' for the current geological epoch**. The impact of current human activities is projected to last and even expand over long periods. … Because of past and future anthropogenic emissions of CO_2, climate will depart significantly from natural behaviour over the next 50,000 years….

- To assign a more specific date to the **onset of the 'Anthropocene' we propose the latter part of the 18th century,** when the global effects of human activities became clearly noticeable,, which show the beginning of a growth in the atmospheric concentrations of several 'greenhouse gases', in particular CO_2 and CH_4. **Such a starting date also coincides with James Watt's invention of the steam engine in 1784.**

1.1. Paul C. Crutzen: Foreword From the Holocene to the Anthropocene
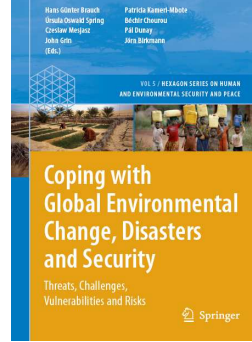
- During 4,5 billion years of Earth history, after a long string of biological processes, only a million years ago, a single species 'homo sapiens' evolved, which grew increasingly capable of influencing the geology of our planet.

- **Holocene:** Since the end of the glacial period (10-12.000 years ago), high civilizations emerged.

- **Anthropocene:** Since 1780 humankind increased GHG concentration in the the tmosphere from 278 ppm to more than 380 ppm today

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

1958-1974 Scripps Inst. Oceanography
1974-2008 NOAA/ESRL
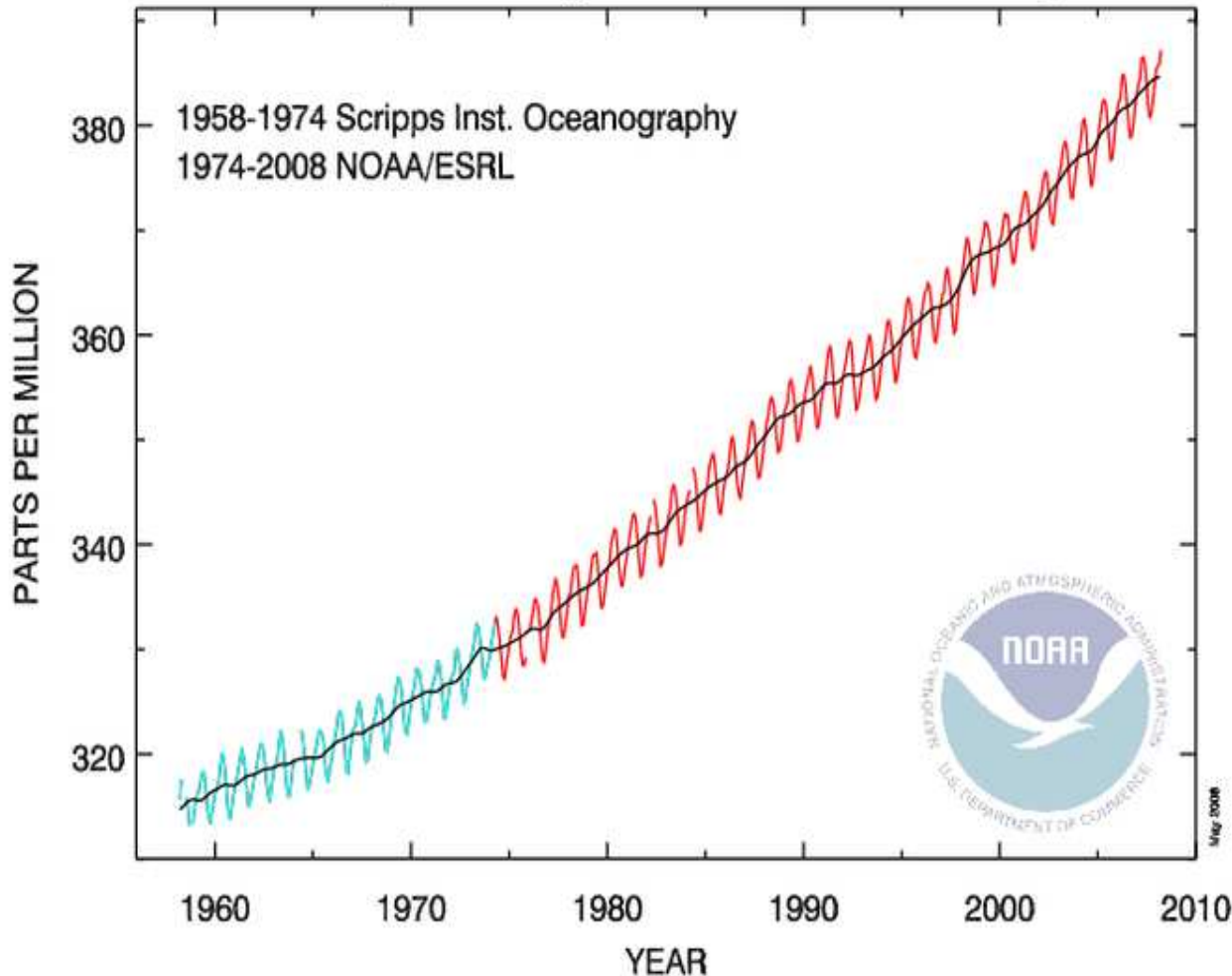
- GHG concen-
  tration in the
  atmosphere

- 1750: 279 ppm,
  1987: 387 ppm

- 1/3: 1750-1958:
  279 to 315 ppm

- 2/3: 1958-1987:
  315 to 387 ppm

1.4. Global Climate Change: 2001-2007
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**
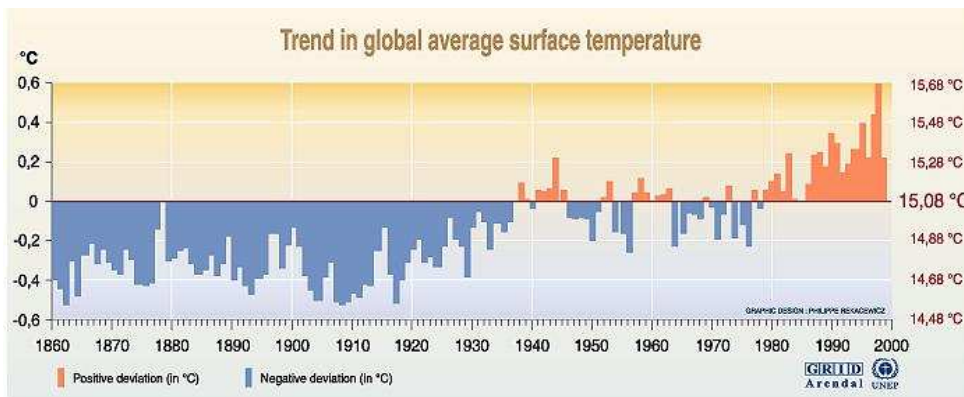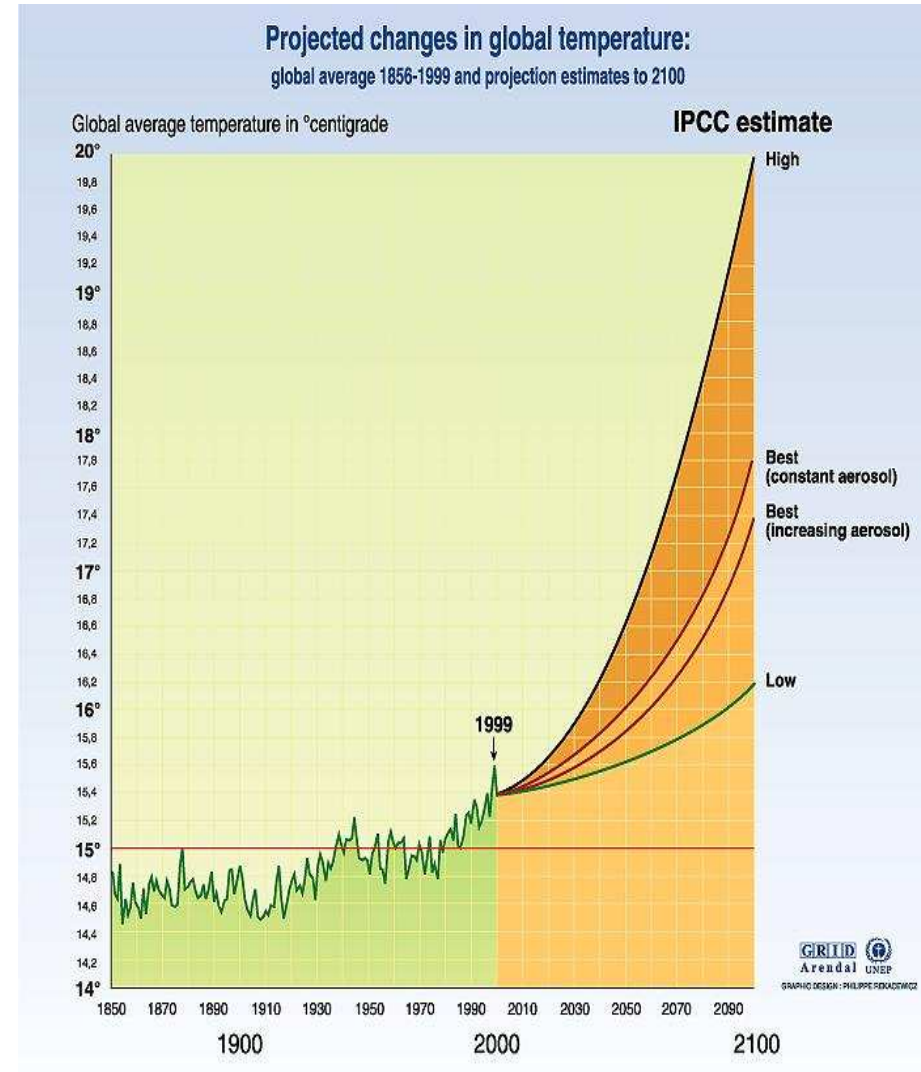
❖ **AR4 (07):+1.1-6.4 (1.8-4)°C**

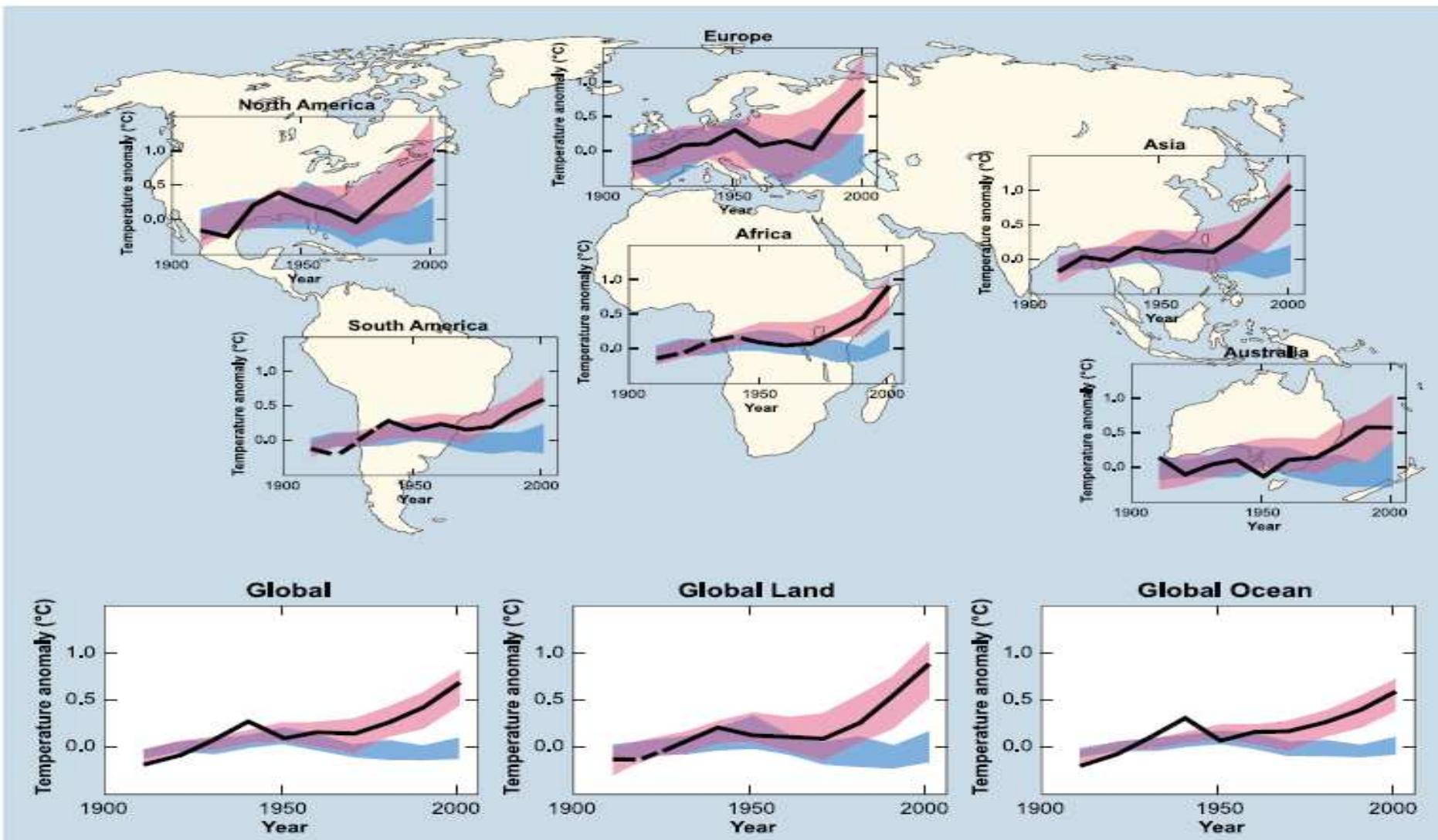**Sources: IPCC 1990,1995,2001,2007**

Sea level Rise:

❖ **20th cent.: +0,1-0,2 metres**

❖ **TAR: 21st century: 9-88 cm**

❖ **AR4 (2000-2100): 18-59 cm**

Trend in global average surface temperature

Positive deviation (in °C)   Negative deviation (in °C)

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

Projected changes in global temperature:
global average 1856-1999 and projection estimates to 2100

Global average temperature in °centigrade

IPCC estimate

High

Best (constant aerosol)

Best (increasing aerosol)

Low

1999

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

# 1.5. Global and Regional Change in Temperature (IPCC 2007, WG 1, AR4, p. 11)

1.6. Anthropogenic Climate Change in the Anthropocene (1900-2100)
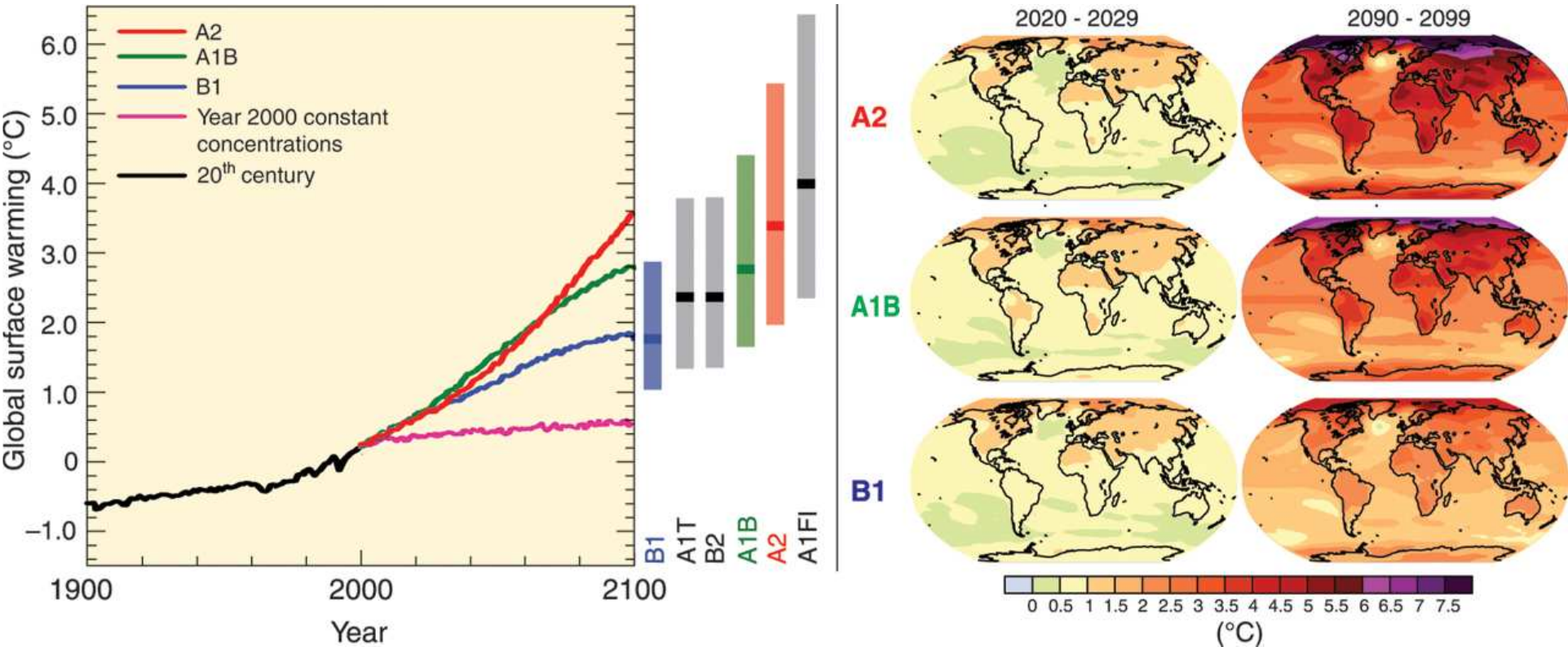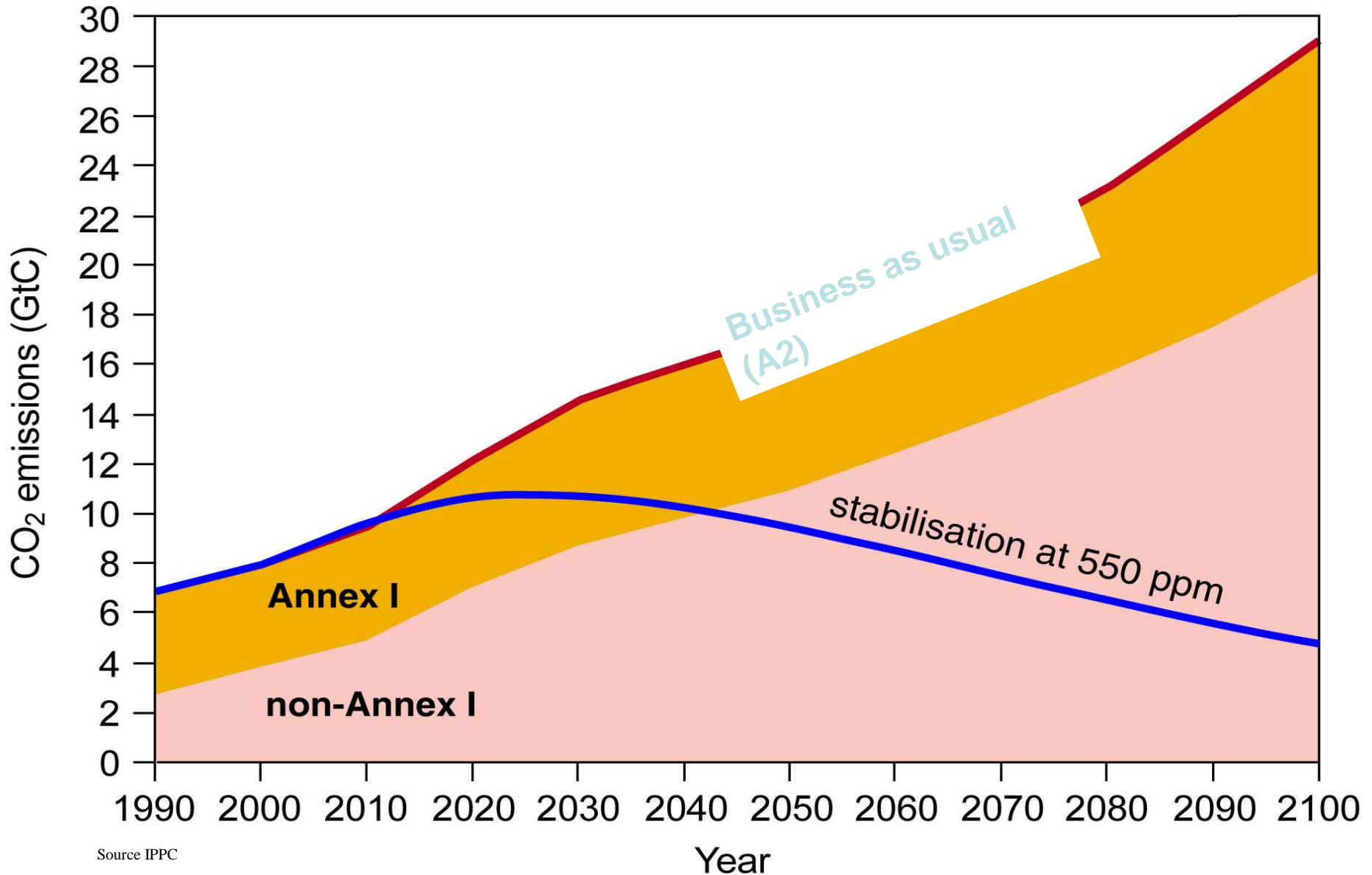

- **Three Regimes for Temperature Increase**
  - +2℃: **certain**: EU Stablization goal (**decision in Copenhagen COP 15)**
  - +4℃: **probable, without immediate Stabilizartion Measures**
  - +6℃: **possible** (business as usual) **(catastrophe scenario)**

1.7. Emissions: Responsibility of Industrial States
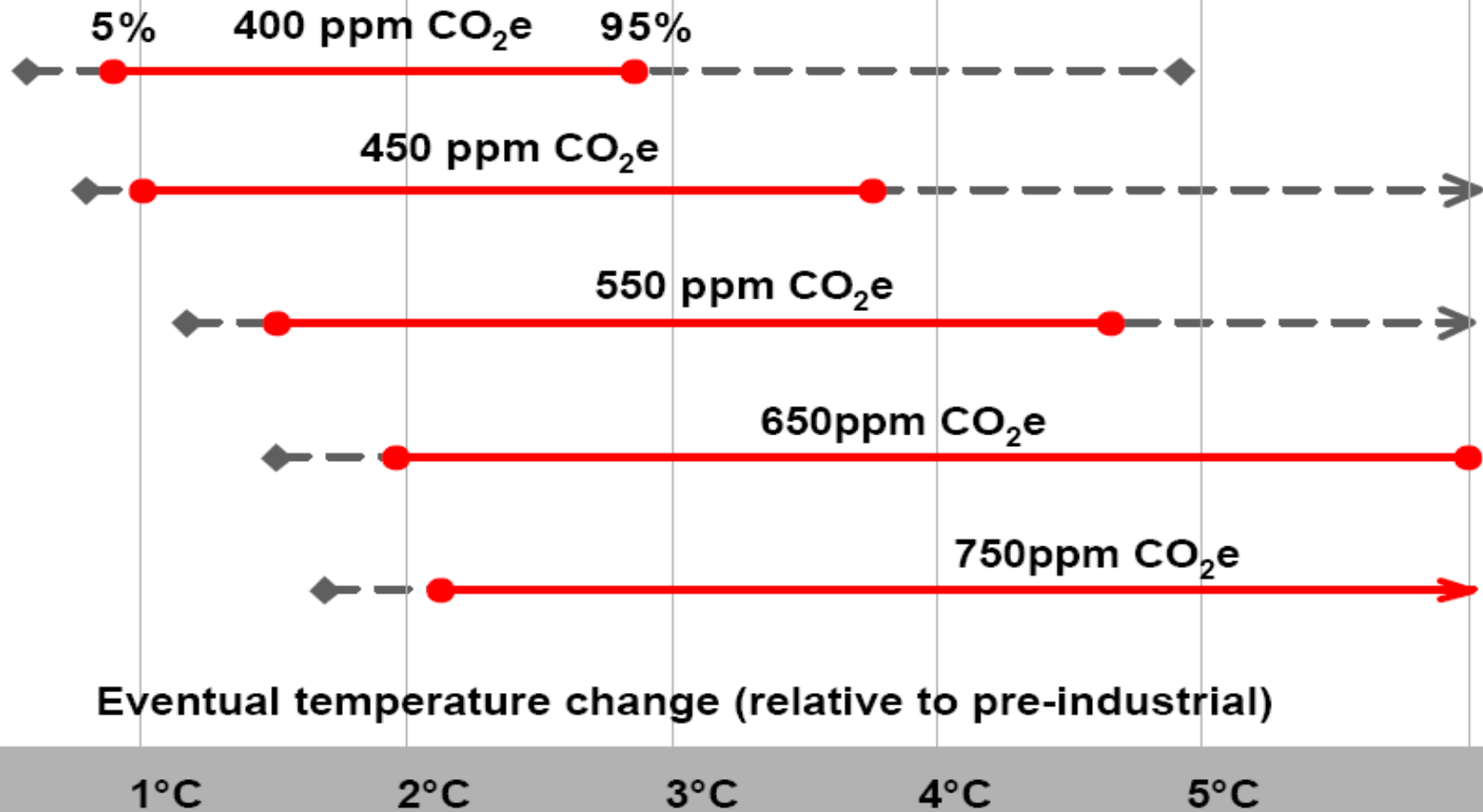## (Tons of CO2 Emissions/Capita in Energy Sector only, 2002)
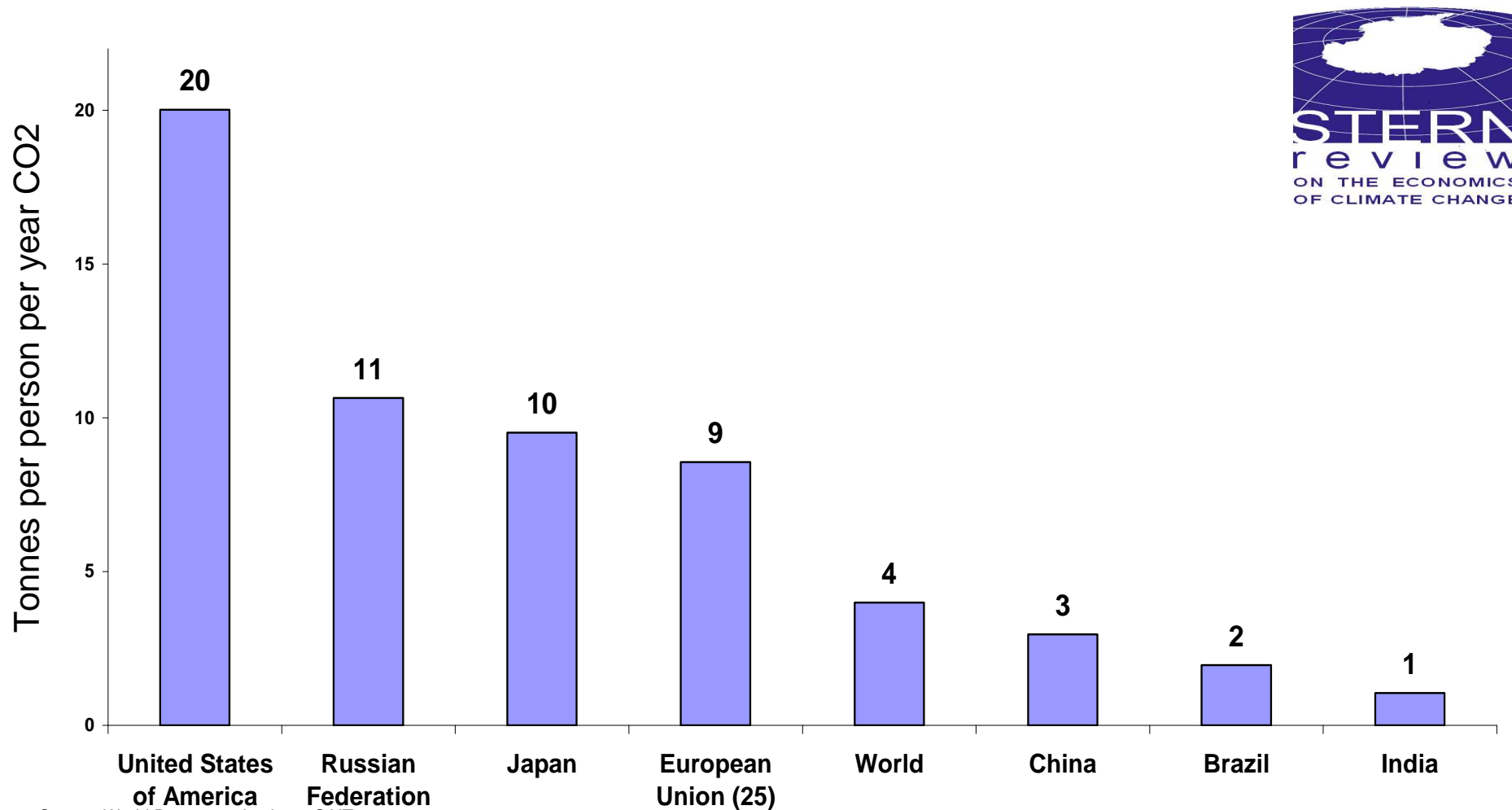
Source: World Resources Institute, CAIT

1.8. Projection: Stabilization at 550 ppm

1.9. Stabilization and Temperature Increase

Stabilisation and Commitment to Warming

5%   400 ppm CO_2e   95%

450 ppm CO_2e

550 ppm CO_2e

650ppm CO_2e

750ppm CO_2e

Eventual temperature change (relative to pre-industrial)

0°C   1°C   2°C   3°C   4°C   5°C

Projected Impacts of Climate Change
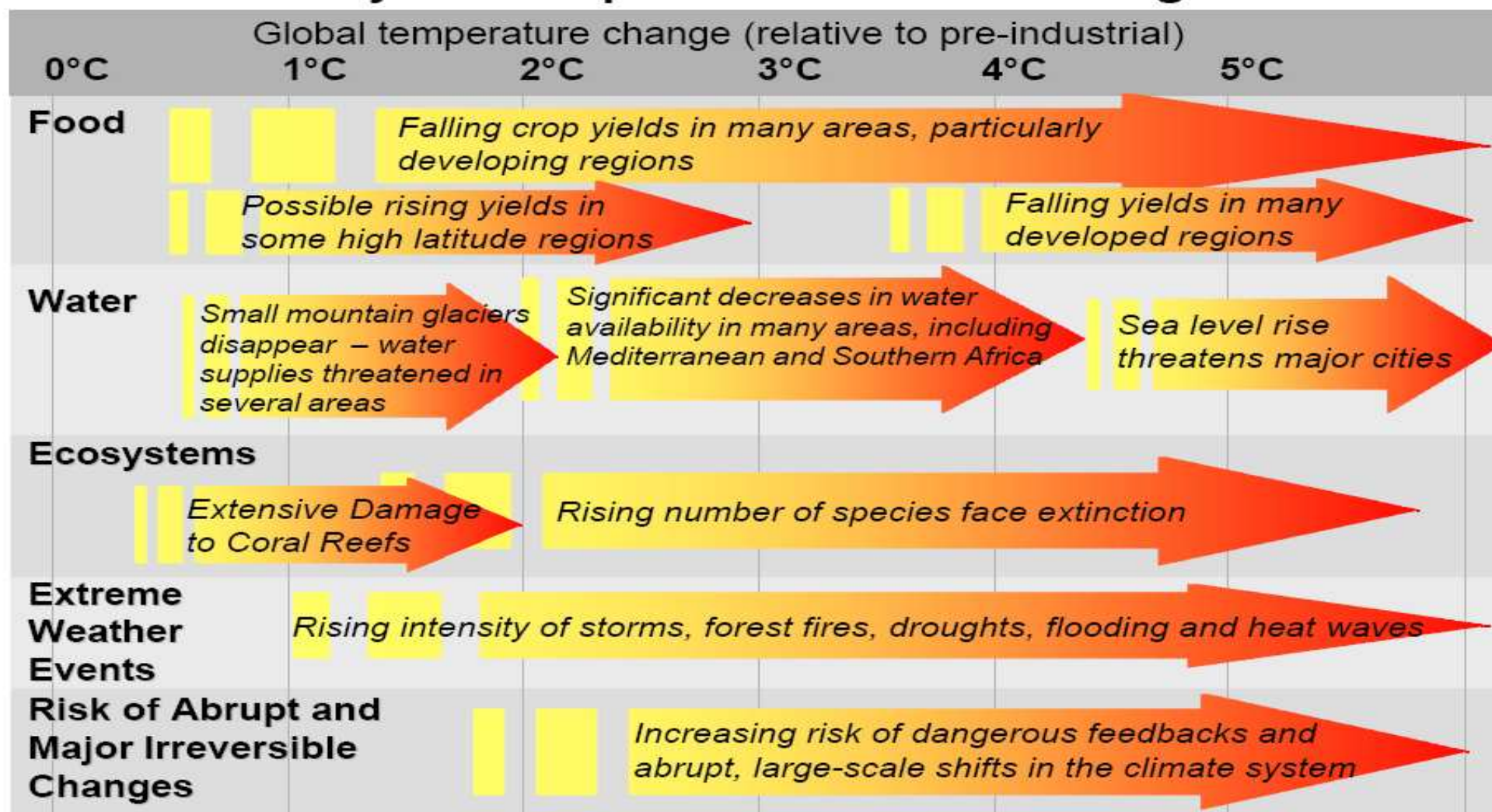
1.11. Projected Increase of Sea Level Rise (IPCC chair, Pachauri, 2008)

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

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

high latitude increases

decreases over some dry regions

percentage changes uncertain in desert regions

changes less reliable in lower latitudes, e.g. monsoon regions

% -40 -20 -10 -5 -2 2 5 10 20 40
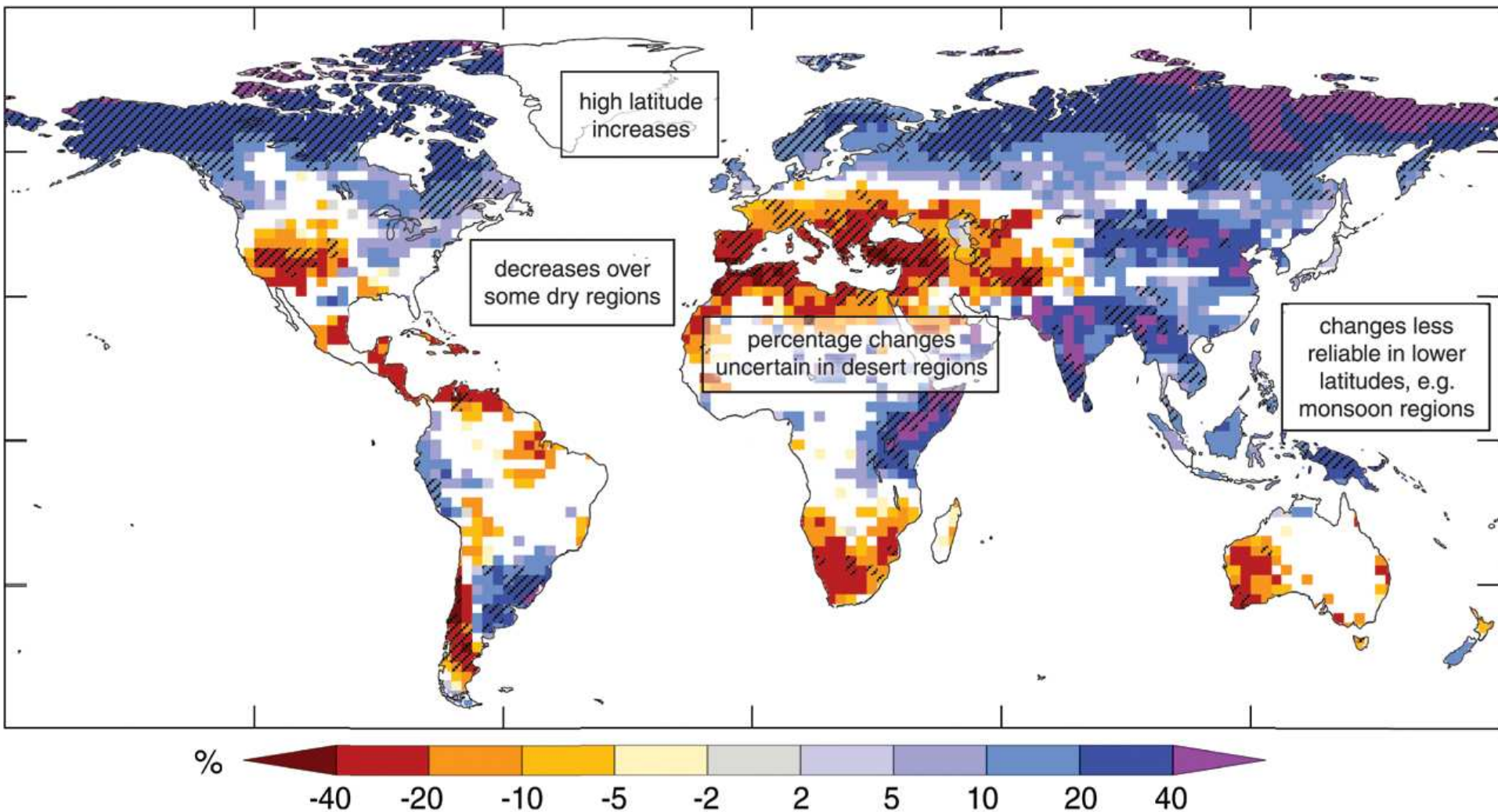
2. Reconceptualizing Security:

- **Basic Assumption & Guiding Question:**
  - Did global and regional political contextual changes trigger a reconceptualizing of security?

- **What did change? Contextual factors:**
  - End of the Cold War: 9 November 1989 or 11 Sept. 2001
  - Process of globalization (1945, globalized in 1990)
  - Shift from 'Holocene' to 'Anthropocene'

- **Which were the conceptual innovations?**
  - Theoretical: social constructivism & Beck: risk society
  - Widening, deepening & sectorialization of security

2.1. Which Conceptual Innovations?

- **1989-1991: End of the Cold War (E-W-C)**
  - **Widening**: from 2 to 5 security dimensions
  - **Deepening**: from national to human security
  - **Sectorialization**: energy,food,health,water security
- **Globalization: Econ. crises & social vulnerability**
  - **New actors: terrorists vs organized crime**
  - **Crises, Globalization & Complex Emergencies:** poverty: high economic and **social vulnerability**
- **Does Global Environmental Change & natural hazards pose new security dangers?**
  - Global Environmental Change: pressure & cause
  - Impact: Water-related natural hazards: & societal outcome (victims): migration & conflcits depend on social vulnerability

2.2. Objective, Subjective, Intersubjective Security

- Wolfers (1962) pointed to two sides of the security concept: "Security, in an *objective* sense, measures the absence of threats to acquired values, in a *subjective* sense, the absence of fear that such values will be attacked".

- **Objective security dangers:** absence of threats

- **Subjective security concerns: perception of** absence of fear

- From a constructivist approach in international relations 'security' is the outcome of a process of social & political interaction where social values & norms, collective identities & cultural traditions are essential. Security: **intersubjective** or "what actors make of it".

- **Copenhagen school** security as a "speech act", "where a securi-tizing actor designates a threat to a specified reference object and declares an existential threat implying a right to use extraordinary means to fend it off".

- Such a process of "securitization" is successful when the construc-tion of an "existential threat" by a policy maker is socially accep-ted and where "survival'" against existential threats is crucial.

2.3. Copenhagen School: Securitization

- **Securitization**: discursive & political process through which an intersubjective understanding is constructed within a political community to treat something as an existential threat to a valued referent object, and to enable a call for urgent and exceptional measures to deal with the threat.
- **'Referent object'** (that is threatened and holds a general claim on 'having to survive', e.g. **state, environment or liberal values**),
- '**Securitizing actor'** (who makes the claim – speech act – of pointing to an existential threat to referent object thereby legitimizing extraordinary measures, but not necessarily to be carried out by the actor),
- '**Audience'** (have to be convinced in order for the speech act to be successful in the sense of opening the door to extraordinary measures).
- **It is not up to analysts to settle the** 'what is security?' question – widening or narrowing– but more usefully one can study this as an open, empirical, political and historical question.
- **Who manages to securitize what under what conditions & how?**
- **What are the effects of this?** How does the politics of a given issue change when it shifts from being a normal political issue to becoming ascribed the urgency, priority and drama of '**a matter of security'.**

2.4. Security Perception: Worldviews and Mind-sets

- Perceptions of security dangers (concerns) depend on worldviews of analyst & mind-set of policy-maker.
- Mind-set (Ken Booth): have often distorted perception of new challenges: include ethnocentrism, realism, ideological fundamentalism, strategic reductionism
  - Booth: Mind-sets freeze international relations into crude ima-ges, portray its processes as mechanistic responses of power and characterize other nations as stereotypes.
  - Old Cold War mind-sets have survived global turn of 1989/1990
- 3 worldviews are distinguished by the English school:
  - *Hobbesian* pessimism (realism): power
  - *Kantian* optimism (idealism) *international law* & *human rights*
  - *Grotian* pragmatism: multialteralism, *cooperation* is vital.
- 3 ideal type perspectives in other cultures & traditions:
  - Power matters: Sunzi, Thukydides, Machiavelli, Hobbes,
  - Ideas matter: Kant, W. Wilson
  - Cooperation matters: Confucius, Grotius

2.5. From International & National to four Pillars of Human Security

- **International Peace & Security**: League of Nations (1919):"high contracting parties"; UN Charter (1945): "*We the peoples of the United Nations*"
- **National Security:** new U.S. concept World War II, post WW II: National Security Act (1947), before: goal defence, means: Army (War Dep.), & Navy Dept.
- **Alliance Security:** NATO (1949-), WP (1955-2001)
- **Common Security** (Palme Report 1982)
- **Environmental Security** (Brundtland 1987)
- **Cooperative Security:** Brookings Institution (1990's)
- **Human Security:** UNDP (1994): 4 pillars of HS
    - **Freedom from fear: humanitarian law agenda (Norway, Canada)**
    - **Freedom from want: development agenda (Japan & developing c.)**
    - **Freedom to live in dignity: democratic governance, human rights**
    - **Freedom from hazard impacts: natural hazard & disaster agenda**

2.6. Widening of Security Concepts: Towards Environmental Security

4 trends in reconceptualisation of security since 1990:

- **Widening** (dimensions, sectors), **Deepening** (levels, actors)
- **Sectorialisation** (energy, food, health),
- **Shrinking** (WMD, terrorists)

Dimensions & Levels of a Wide Security Concept

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	

2.7. Environmental & Human Security

Expanded Security Concepts (Møller, '03; Oswald '01)

Label	Reference object	Value at risk	Source(s) of threat
National security	**The State**	**Territ. integrity**	**State, substate actors**
Societal security	**Societal groups**	**Nation. identity**	**Nations, migrants**
Human security	Individual, mankind	Survival	Nature, state, global.
Environmental sec.	**Ecosystem**	**Sustainability**	**Humankind**
Gender security (Oswald Spring)	**Gender relations, indigenous people, minorities**	**Equality, identity, solidarity**	**Patriarchy, totalitarian in-stitutions (governments, churches, elites) intoler.**

Human security: Referent: individuals and humankind. [**Human Security Network**]
❖**Values at risk: survival of human beings and their quality of life.**
❖**Major source of threat: nature (global environmental change), globalisation, nation state with its ability to cope with this dual challenge.**
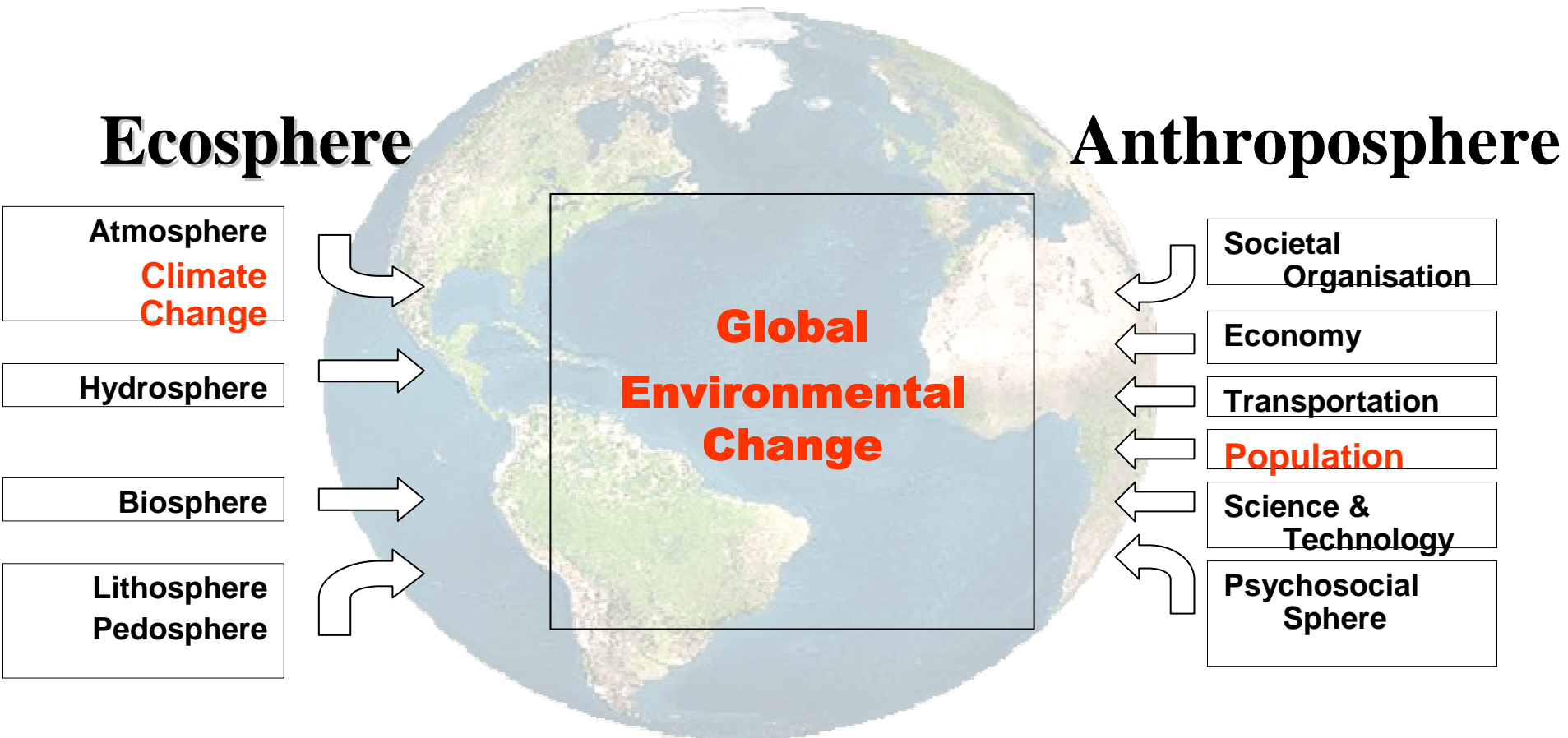**Environmental Security: Referent: Ecosystem; Value at risk is sustainability.**
❖ **Major challenges**: **global environmental change & humankind,**

3. Climate Change as a Security Issue

- – What is the linkage between both?
  - • A key problem of global environmental change
  - • A key area of international relations
- – Securitizing climate change:
  - • GECHS (1999),
  - • Brauch for BMU (2002),
  - • U.S. DoD (2004), CAN (15 April 2007)
  - • UNSC (17 April 2007),
  - • CC as international, national and human security
- – UNFCCC & IPCC: epistemic community as a securitizing actor major concern in Europe

3.1. Global Environmental Change (GEC)

Ecosphere

Anthroposphere

Atmosphere
Climate Change

Hydrosphere

Biosphere

Lithosphere Pedosphere

Global Environmental Change

Societal Organisation

Economy

Transportation

Population

Science & Technology

Psychosocial Sphere

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

3.2. Global Environmental Change

- Since 1970/80s: '*global environmental change*' (GEC) new topic in natural & social sciences: scientization
- Since 1988 politicization with policy efforts on:
  - Climate Change: 1988: issue of G7; 1990: UN GA mandate; 1992: Rio summit: UNFCC (1992) and Kyoto Protocol (1997)
  - Desertification: UNCCD (1994)
- Since 2000: GEC as security issues: securitization
  - Since 2000: The Hague: water security
  - Since 2002: climate change as security threat/risk
  - Since 2003: NATO: Desertification as a security issue
  - Since 2009: UNCCD: Soil security

3.3. Climate Change as an Issue of International Politics and Security

Objective: climate change has influnced history for millennia
Subjective: perception of climate change as a political issue
– **1896: Arrhenius hypothesis:** energy & climate change
– **Climate Change became an issue of IR since 1988**
Intersubjective: what policy actors make of it
– 1988: Reagan Admin. put CC on agenda of G-7
– 1990: IPCC set up by UN General Assembly
– 1992: Rio Earth Summit: UNFCC signed
– 1997: Kyoto protocol approved (-5.1% by ,08)
– 2007: Bali Road Map to COP 15: Copenhagen
Intersubjective: Securitization of climate change
– Problem of environmental security: BMU/Brauch (2002)
– Problem of national security (UK, USA, 2004, 2007)
– Problem of international security: UNSC (2007), UN-GA, SC (2009)
– Problem of human security (GECHS, 2005; HSN: Greece 2007/2008)

3.4. Securitization of Global Environmental & Climate Change

- **3-fold debate & discourse on Climate Change**
  - **Theory: Securitization by O. Waever (Copenhagen.)**
  - **International Security**
    - British, German and European debate (2001-2002)
    - goal: Strategy of conflict prevention through pro-aktive action: Environment-, development- & economic policy
  - **National Security:** (since 2003/2004) especially in USA
    - US debate: 2003/2004: Randall/Schwartz
    - 2007: new military missions for Pentagon
  - **Human Security:**
    - **GECHS Project of IHDP:** social vulnerability of poor and marginalized people, workshop in 2005: (1999-2009)
    - **Human Security Network:** Greek presidency (2007-2008)

3.5. Discourse 1: Climate Change & Internat. Security
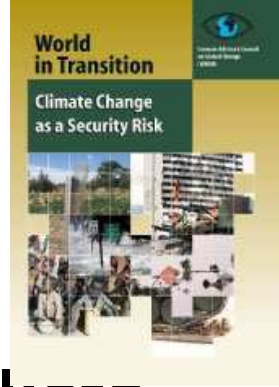
- **BMU-Report 2002: Climate change and conflicts**
  - Goal: Agenda setting for IPCC
    - Coalition: Germany, Great Britain, Finland, Mexico
    - Focus: Small Island states, Bangladesh, Mexico, Egypt, MMR
  - OECD-Case studies: Bangladesh, Egypt, Tansania, Nepal, Fiji
- **WBGU-Report 2008: Security Risk Climate Change**
  - State-centred security concept
  - 4 Conflict scenarios:
    - Climate-induced degradation of drinking water
    - Climate-induced reduction of food production
    - Climate-induced of increase of storm and floods, drought and famine
    - Climate-induced migration

3.6. Climate Change as a Problem of International Security

- ## UNSC debate (17.4.2007)
  - UK Foreign minister:**52 States participated (instead 15 UNSC)**
    - **For the Debate:** UN-SG, Ban Ki-moon, UK, all EU-states, Alliance of small Island States
    - **Sceptical:** Russia, USA, **Opposed:** China, Group of 77 (Pakistan)
- ## June 2009: UN-GA resolution: SIDS: report by SC
  - **Response of some 30 states: PSIDS**
  - **11 September 2009: Report by SC: pointed to five channels: climate change and security:**
    - **(a) *Vulnerability*: Climate change threatens food security and human health, and increases human exposure to extreme events.**
    - **(b) *Development*: If climate change results in slowing down or reversing the development process, this will exacerbate vulnerability and could undermine the capacity of states to maintain stability.**
    - **(c) *Coping and security*: Migration, competition over natural resources and other coping responses of households and communities faced with climate-related threats could increase the risk of domestic conflict as well as have international repercussions.**
    - **(d) *Statelessness*: There are implications for rights, security, and sovereignty of the loss of statehood because of the disappearance of territory.**
    - **(e) *International conflict*: There may be implications for international cooperation from CC impact on shared or undemarcated international resources**
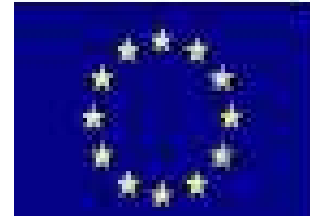
Threat multipliers and threat minimizers: the five channels
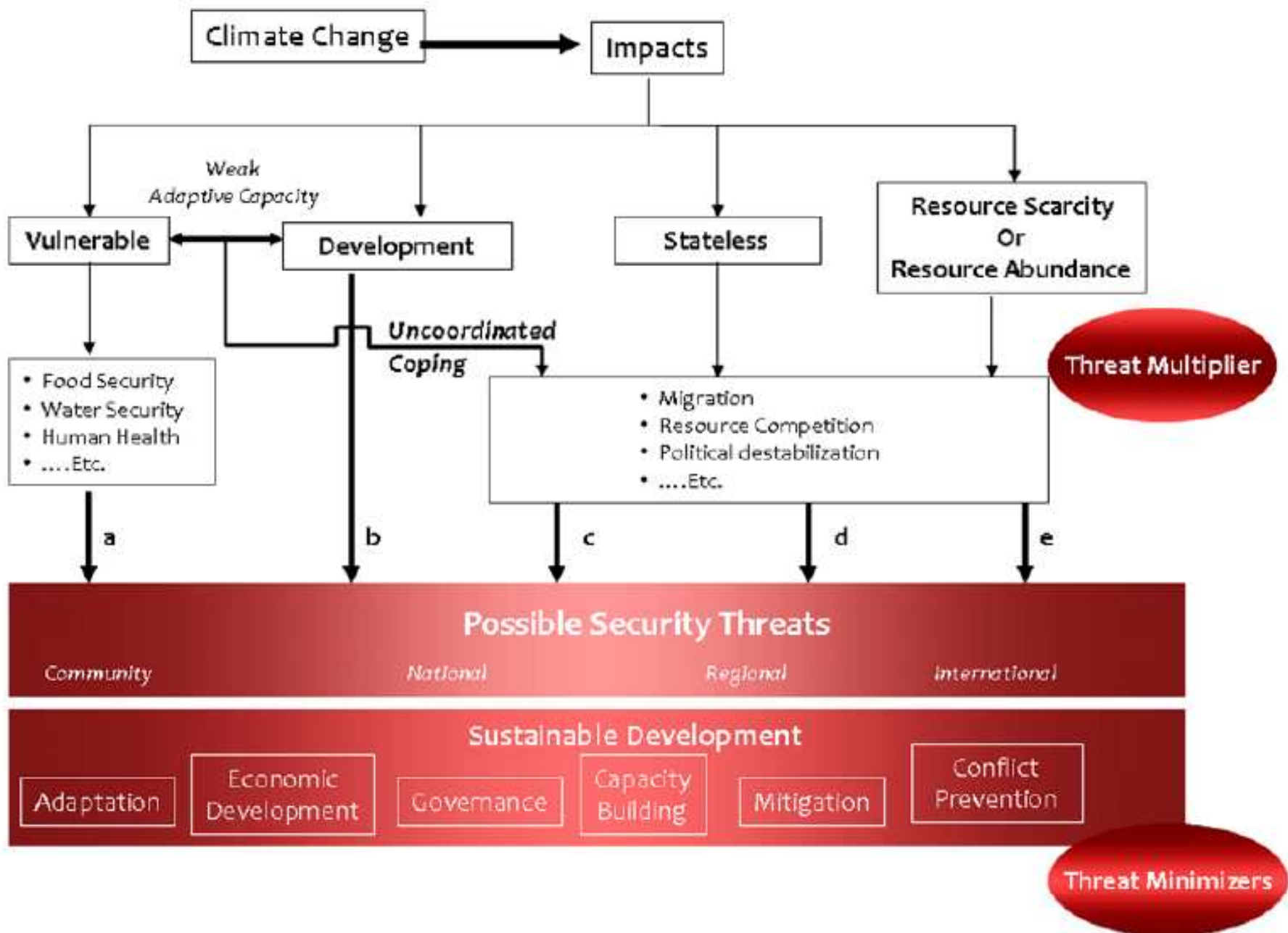
Source: United Nations Secretariat, based on submissions of Member States and relevant organizations.

3.8. 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**

3.9. 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**

- **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*

US National Security Strategy 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.**

- *Home***:** Our effort begins with the steps that we are taking at home. We will stimulate our energy economy at home, reinvigorate the U.S. domestic nuclear industry, increase our efficiency standards, invest in renewable energy, and provide the incentives that make clean energy the profitable kind of energy. This will allow us to make deep cuts in emissions—in the range of 17 percent by 2020 and more than 80 percent by 2050. This will depend in part upon comprehen-sive legislation and its effective implementation.

- *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

3.11. 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.
- **Friends of Human Security: Japan & Mexico: June 2009**
- **Debate in UN General Assembly**
  - **May 2007:** human security: climate change as a threat
  - **June 2009:** Resolution on climate migration: international peace & security

Climate Change & Security: Challenges for a New Peace and Security Policy in the Anthropocene

- **New security challenges require new security & peace policy for the Anthropocene**
- **We are the threat! Impossibile to fight war against oneself**
  - **threat:** our fossil energy consumption and way of life
  - **solution: GHG reduction by 2050: -50% (global), -80% ICs**
    - Electricity, heating, transportation, industry
    - Incrase in energy efficiency and renewable energy
  - **Global responsibiligy and global action**
  - **Proactive vs. reactive Policy and Crisis Management**
    - **Reactive: Welt financial crisis: no price is too high**
    - **Proaktive: climate change: we cannot afford drastic measures**
    - **Short term horizon: political & economic action**

4. Towards the PEISOR Model

- **PEISOR: Result of pressure and response models and of debates on environmental security and on natural hazards.**

The PEISOR model combines five stages:

- *P* (*pressure*) refers to 6-8 drivers of global environmental change
- *E* **to the** *effects* of the linear, non-linear or chaotic interactions within the 'hexagon' on environmental scarcity, degradation, and stress;
- *I* **to extreme or fatal** *impacts* of human-induced and climate-related natural hazards (storms, flash floods, flooding, landslides, drought);
- *SO* **to** *societal outcomes*: internal displacement, migration, urbanization, crises, conflicts, state failure, and
- **R to** *response* **by society**, business community, state where both traditional & modern technological knowledge can make a difference.

Hazards cannot be prevented, their **impact** in terms of deaths, affected people, economic & insured damages can be reduced by policies & measures that link protection with empowerment of the people to become more resilient.

4.1. Global Environmental Change & Impacts: PEISOR Model

| Pressure	Effect	Impact	Societal Outcome	(Policy) Response
Causes of Global Environmental Change (GEC)	Socio-economic interaction Environmental scarcity, degradation and stress	Natural and human-induced hazards	Individual choice (survival dilemma) Societal response	National and International political process, state, societal and economic actors and knowledge

Direct natural link: climate change and extreme weather events

GLOBAL ECONOMIC AND POLITICAL CONTEXT AND CONDITIONS
(security dilemma between states in the international system)

Water   Soil

Biodi-versity

Climate Change

EARTH SYSTEMS

HUMAN SYSTEMS

Population

Socio-economic process

Rural Systems   Urban Systems

(environmental)

Degradation (soil, water, biodiversity)

Stress

Scarcity (soil, water)

Natural hydro-meteoro-logical hazards
· storm (hurricane, cyclone)
· floods, land slides
· drought, forest fire
· heat wave

Geophysical hazards
· earth quakes
· tsunamis
· volcano eruption

Technological and human-induced hazards
· accidents
· deliberate acts (terrorism)

Individual/family/community choice (survival dilemma)
· stay at home & suffer
· move (migrate)
· protest & fight (violence)

Migration   Conflict Avoidance Prevention Resolution

Political process

Crisis   Conflict

Societal response
· massive migration (rapid urbanization rise)
· internal crisis
· violent conflict
· conflict avoidance, pre-vention, resolution

State

Decision

Society   Economy

Coping with GEC & environmental stress (adaptation & mitigation)

Knowledge (traditional & modern Scientific/technological)

NATIONAL ECONOMIC AND POLITICAL CONTEXT AND CONDITIONS)

Socio-economic process (human forces and human systems)

Feedback

P: Pressure: Interactions of GEC

Schematic framework of anthropogenic climate change drivers, impacts and responses (IPCC)
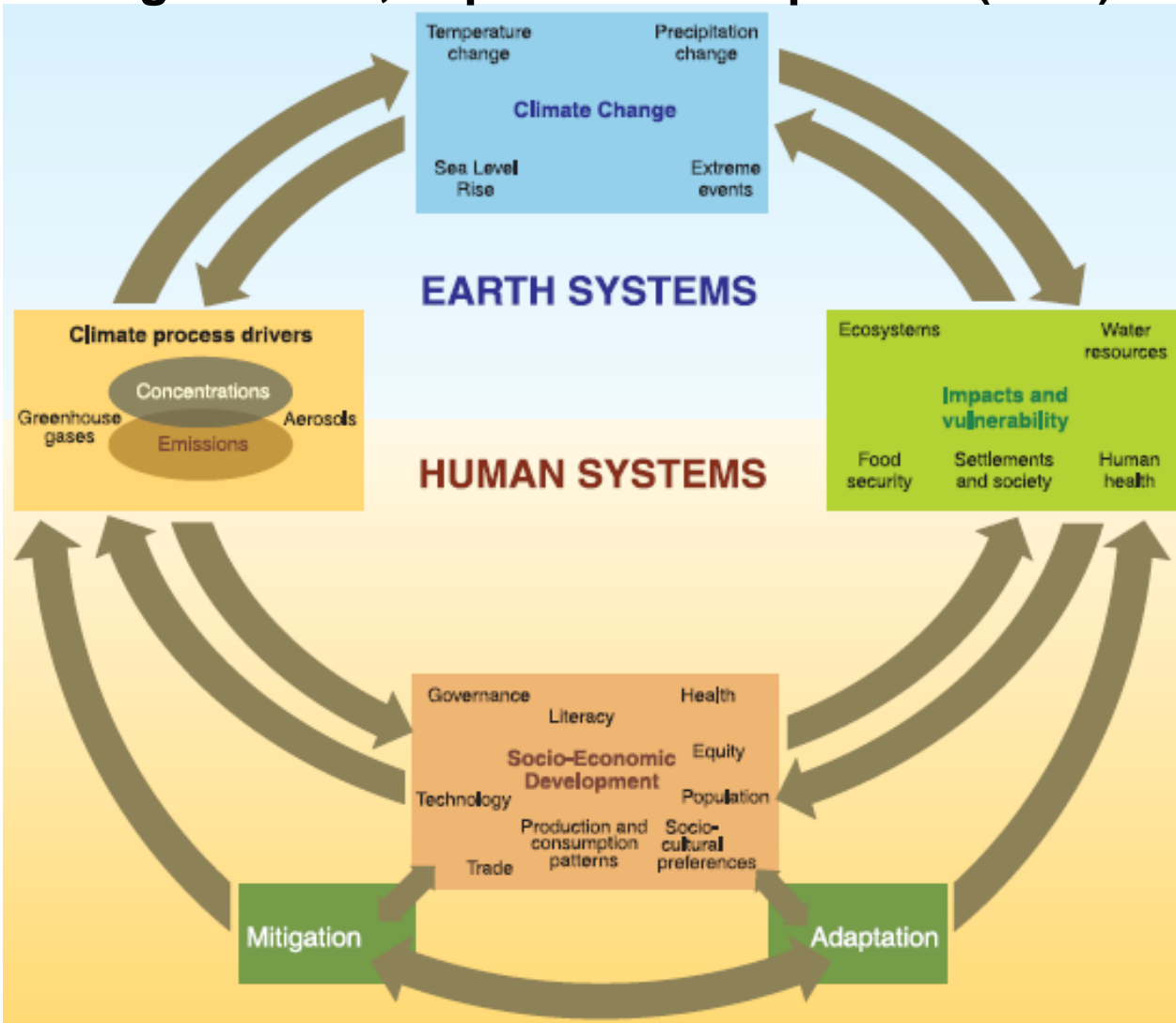
Earth System factors

- **Climate change**
- **Soil**
- **Water**
- **Biodiversity**

Human System factors

- **Population change**
- **Rural systems**
- **Urban systems**
- **Socio-economic cultural processes**

P: Pressure: Interactions of GEC
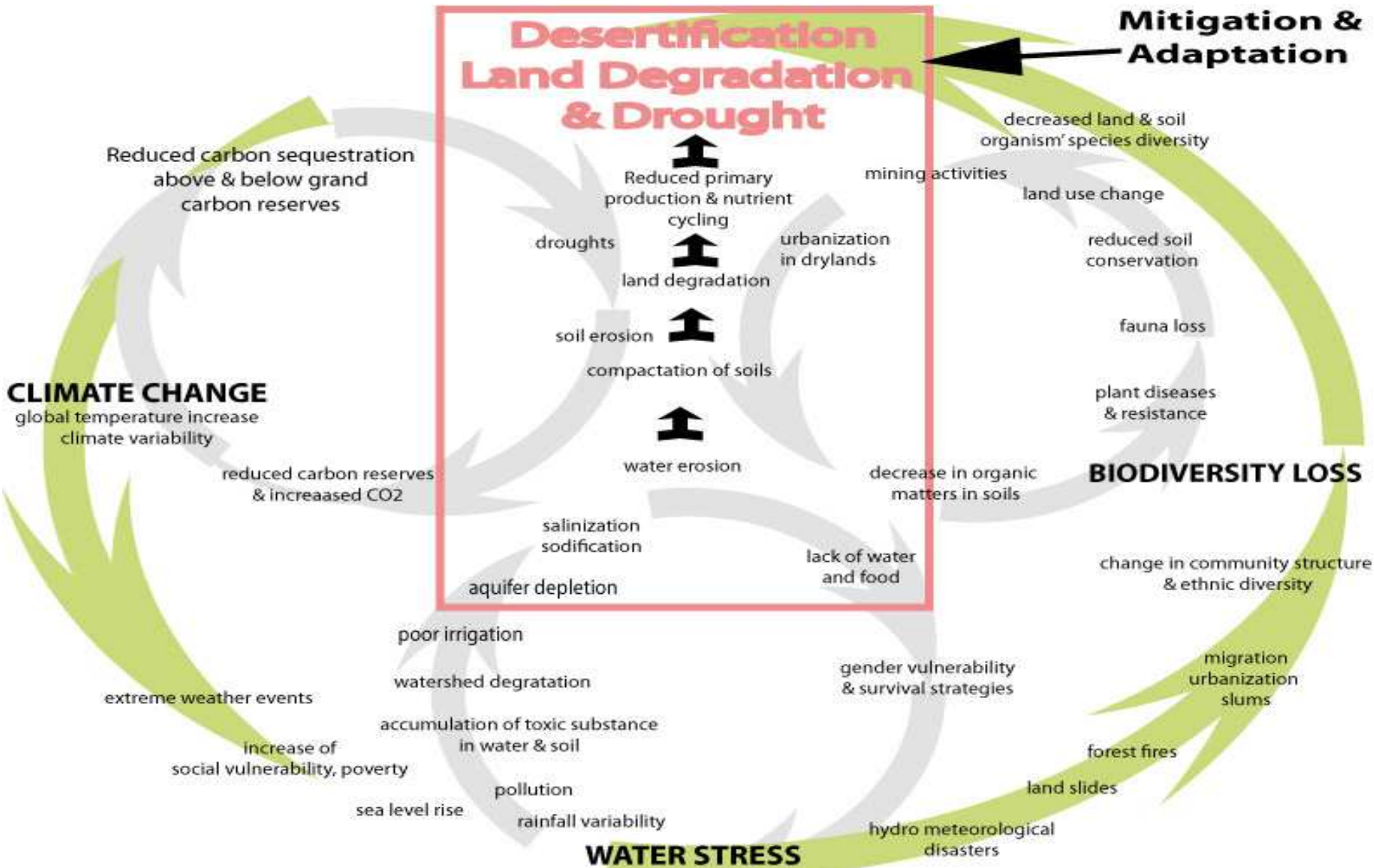
Effect	Impact
Socio-economic interaction Environmental scarcity, degradation and stress	Natural and human-induced hazards

Direct natural link: climate change and extreme weath

↓   ↓

GLOBAL ECONOMIC AND POLITIC
(*security dilemma* between sta

↙   ↓

(environmental)	Natural hydro-meteoro-logical hazards • storm (hurricane, cyclone) → • floods, land slides → • drought, forest fire → • heat wave →
Degradatiion (soil, water, biodiversity)	
↑↓	Geophysical hazards • earth quakes → • tsunamis → • volcano eruption →
Stress →	
Scarcity (soil, water)	Technological and human-induced hazards • accidents • deliberate acts (terrorism)

NATIONAL ECONOMIC AND POLITI

E: Effect & I: Impact

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

Impact: Human-Induced Natural Hazards Drought, Famine and Societal Outcomes
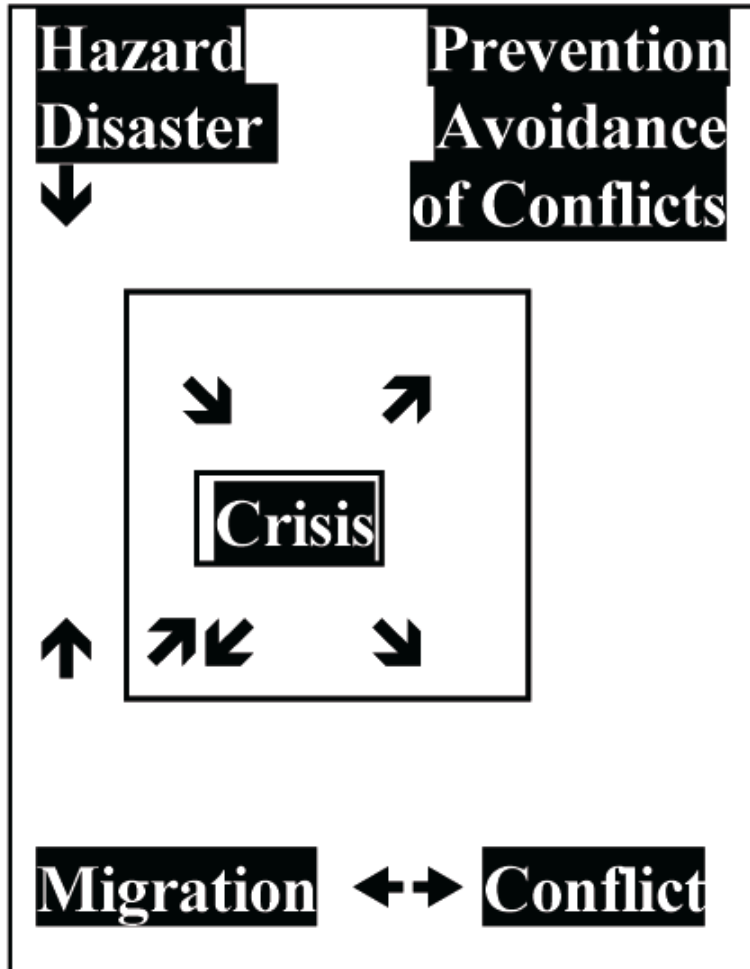
Much knowledge on these factors:

✓ **Drought, migration, crises, conflicts**

Lack of knowledge on linkages among fatal outcomes

➢ **Drought & drought-ind. migration**

➢ **Famine & environm.-ind. migration**

➢ **Conflicts & conflict-induced migration**

Lack of knowledge on societal consequences: crises/conflicts

➢ **Domestic/international crises/conflicts**

➢ **Environmentally or war-induced migration as a cause or consequence of crises and conflicts**

Global Impacts: Major Natural Disasters 1950 – 2005. Source: MunichRe, 2006

© 2006 NatCat*SERVICE*, GeoRisikoForschung, Münchener Rück
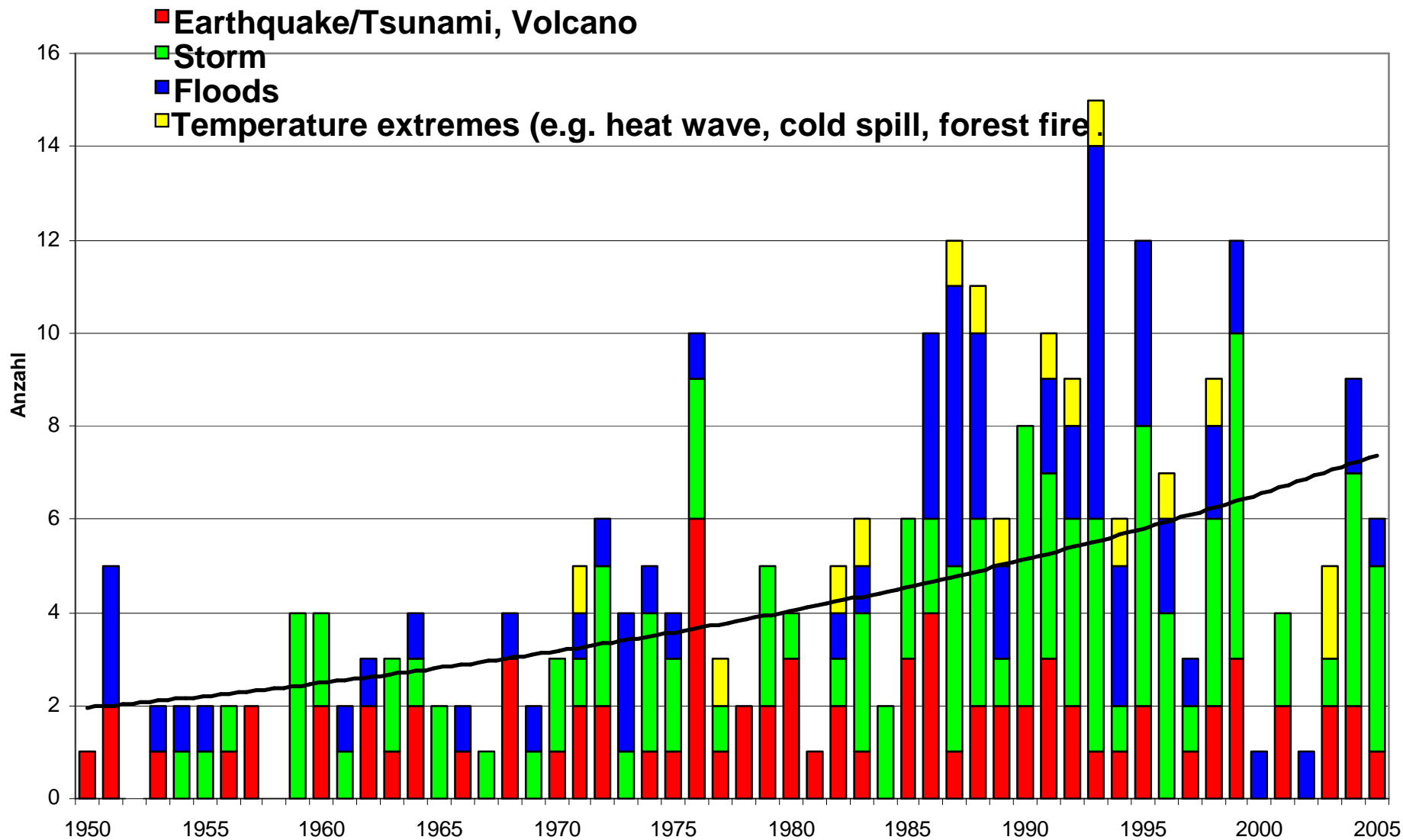
Major Natural Hazards (1950-2005). Source: Munich Re Research Div., 2006

267 Events

29%

40%

25%

6%

Geological events

🟥 **Earthquake/Tsunami, Volcano**

Weather-related events

🟩 **Storm**

🟦 **Floods**

🟨 **Extreme temperatures**

1,75 Million Dead

2%

55%

36%

7%
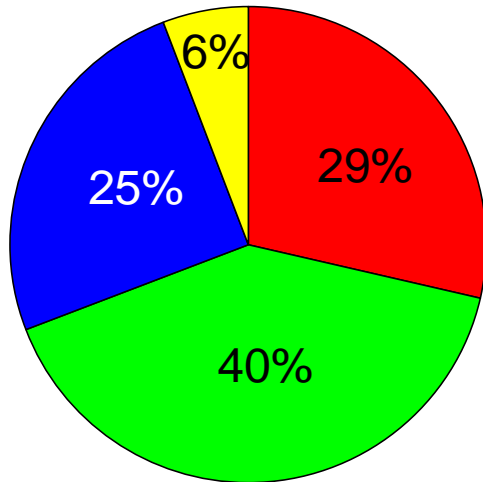
Economic damage: 1.400 billion US$

31%

38%

25%

6%
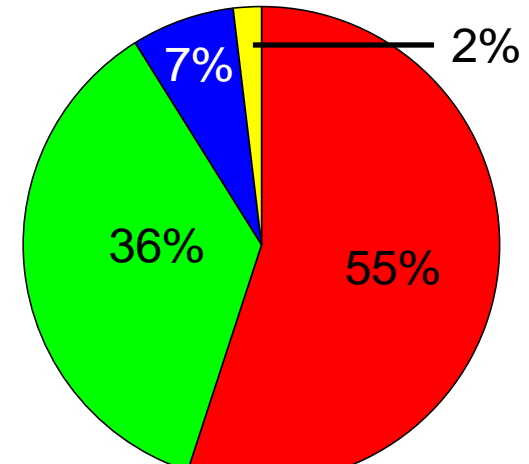
Insured damage: 340 billion US$

11%

79%

5%

5%
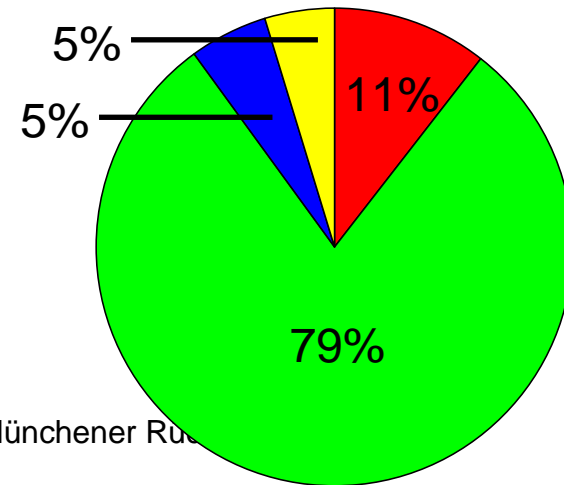
*in Werten von 2005

© 2006 GeoRisikoForschung, Münchener Rück

Reported Death of Natural Hazards globally (1974-2003): **2.066.273** persons
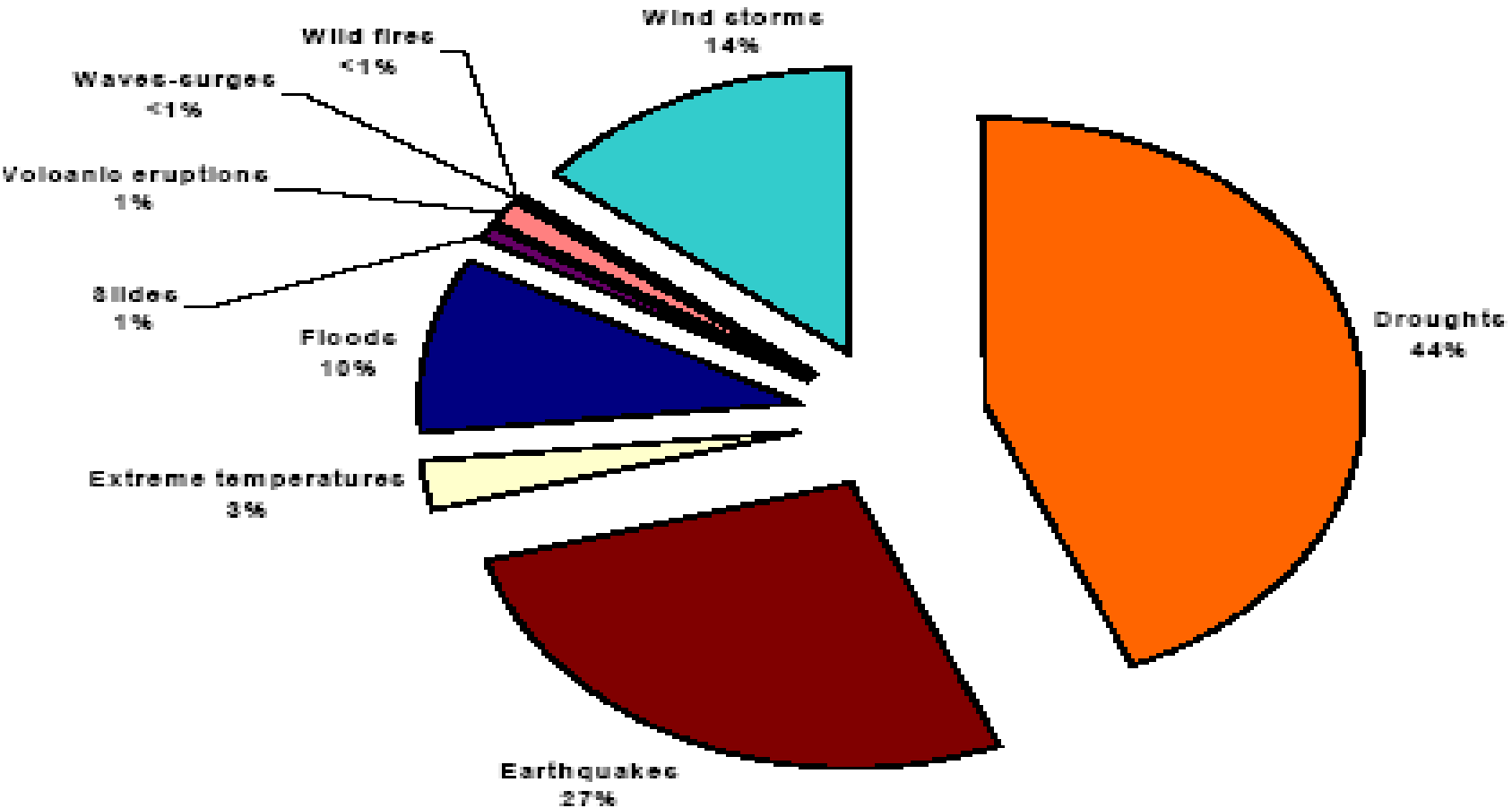
Source: © Hoyois und Guha-Sapir (2004)

Affected persons of Natural Hazards globally (1974-2003): 5 076 494 541 persons
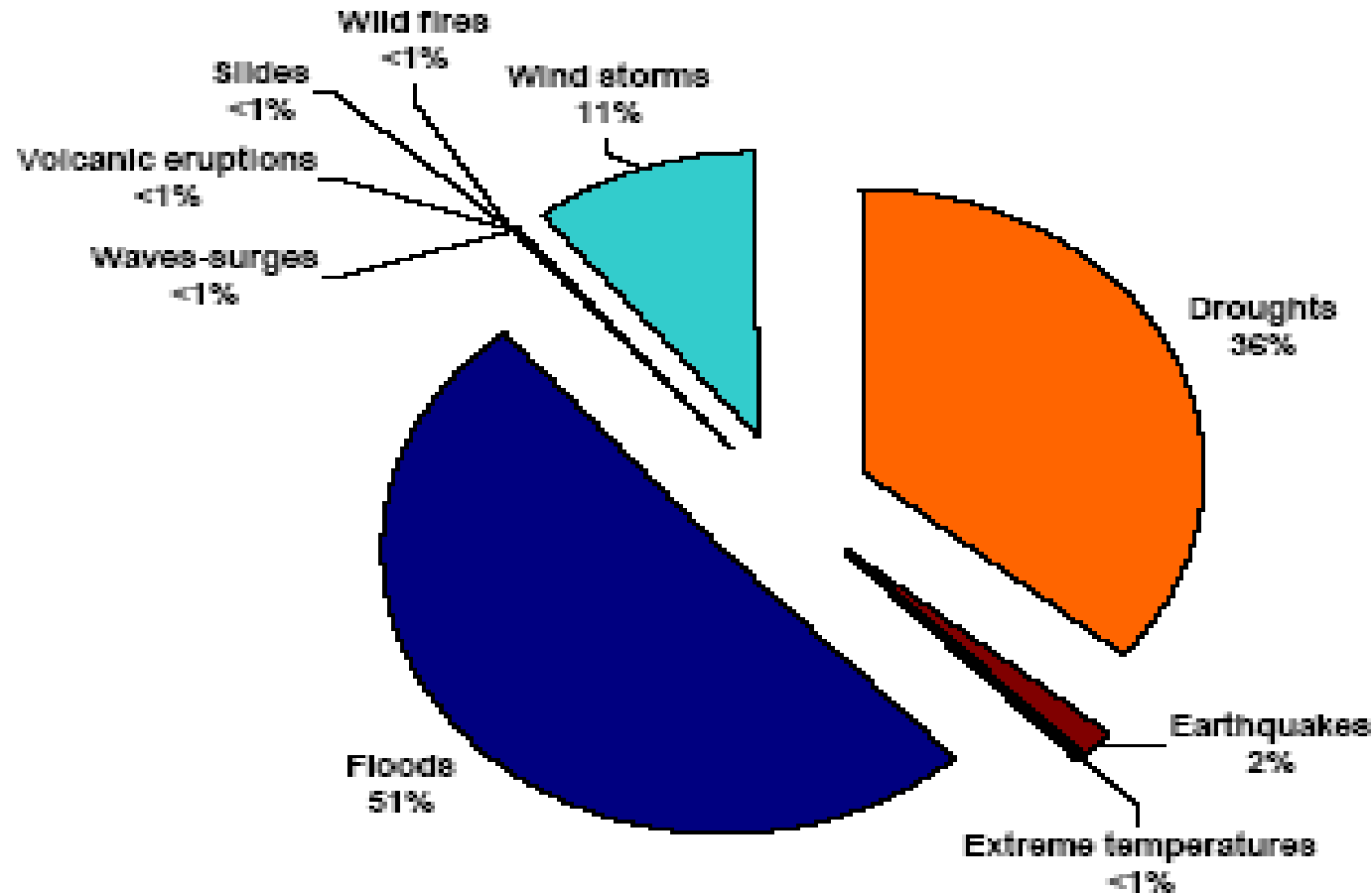
Source: © Hoyois und Guha-Sapir (2004)

Most severe droughts (1900-2008)

By the number of people killed on the country base			By the number of people affected on the country base		
Country	**Date**	**Killed**	**Country**	**Date**	**Affected (million)**
China P R.	1928	3,000,000	India	1982	300
Bangladesh	1943	1,900,000	India	2002	300
India	1942	1,500,000	India	1972	200
India	1965	1,500,000	India	1965	100
India	1900	1,250,000	India	Jun 82	100
Sov. Union	1921	1,200,000	China P. R.	Jun 94	82
China P R.	1920	500,000	China P. R.	April 2002	60
Ethiopia	May 83	300,000	India	April 2000	50
Sudan	April 83	150,000	China P. R.	June 1988	49
Ethiopia	Dec 73	100,000	China P. R.	Jan. 2003	48

Societal Outcome	(Policy) Response
Individual choice (*survival dilemma*) Societal response	National and international political process, state, societal and economic actors and knowledge
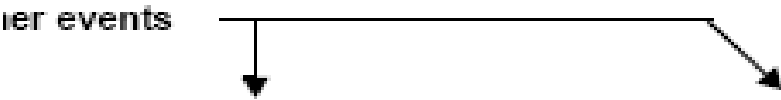
...er events

...CAL CONTEXT AND CONDITIONS
...tes in the international system)

Individual/family/ community choice (*survival dilemma*)
- stay at home & suffer
- move (migrate)
- protest & fight (violence)

Migration   Conflict Avoidance Prevention Resolution

Political process

Crisis   Conflict

Societal response
- massive migration (rapid urbanization rise)
- internal crisis
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State

Decision

Society   Economy

Coping with GEC & environmental stress (adaptation & mitigation)

Knowledge (traditional & modern Scientific/technological)
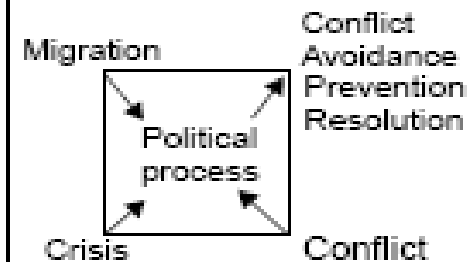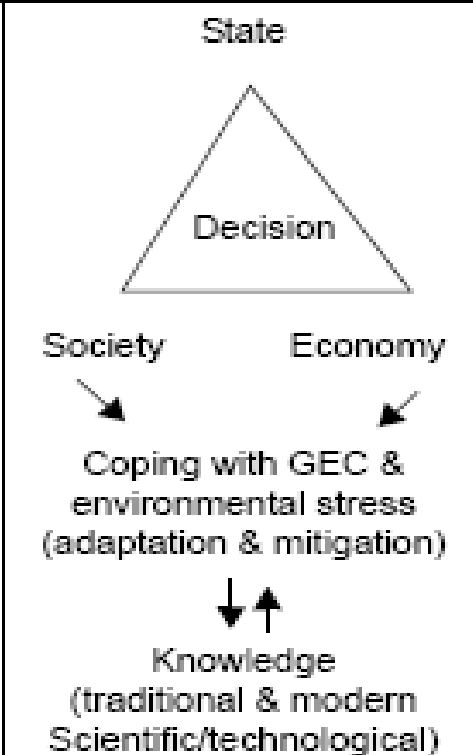
SO: Societal Outcomes

- Individual level (choice)
  - Human security perspect.
  - 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
    - Violent clashes
  - Complex emergencies

Global Hunger Index 1990 & 2008

←2008 Global Hunger Index.
Country progress in reducing the Global Hunger Index between 1990 and 2008 ↓
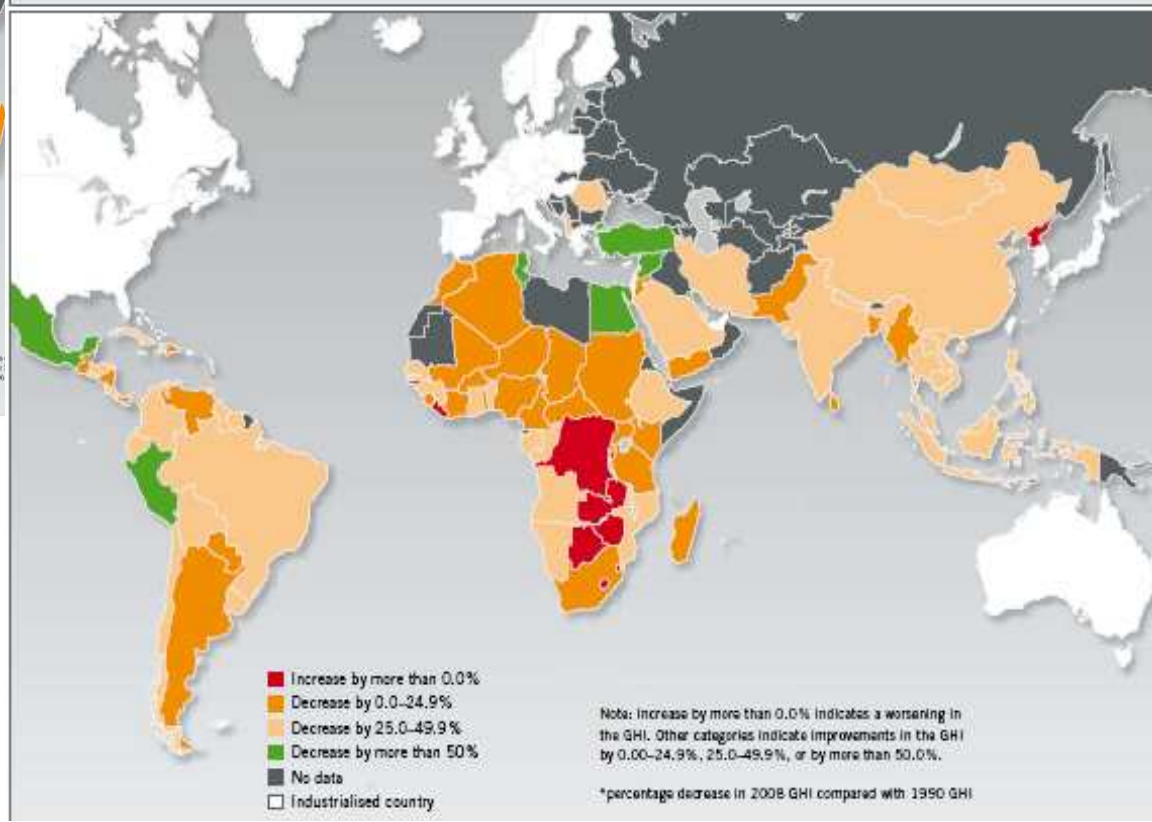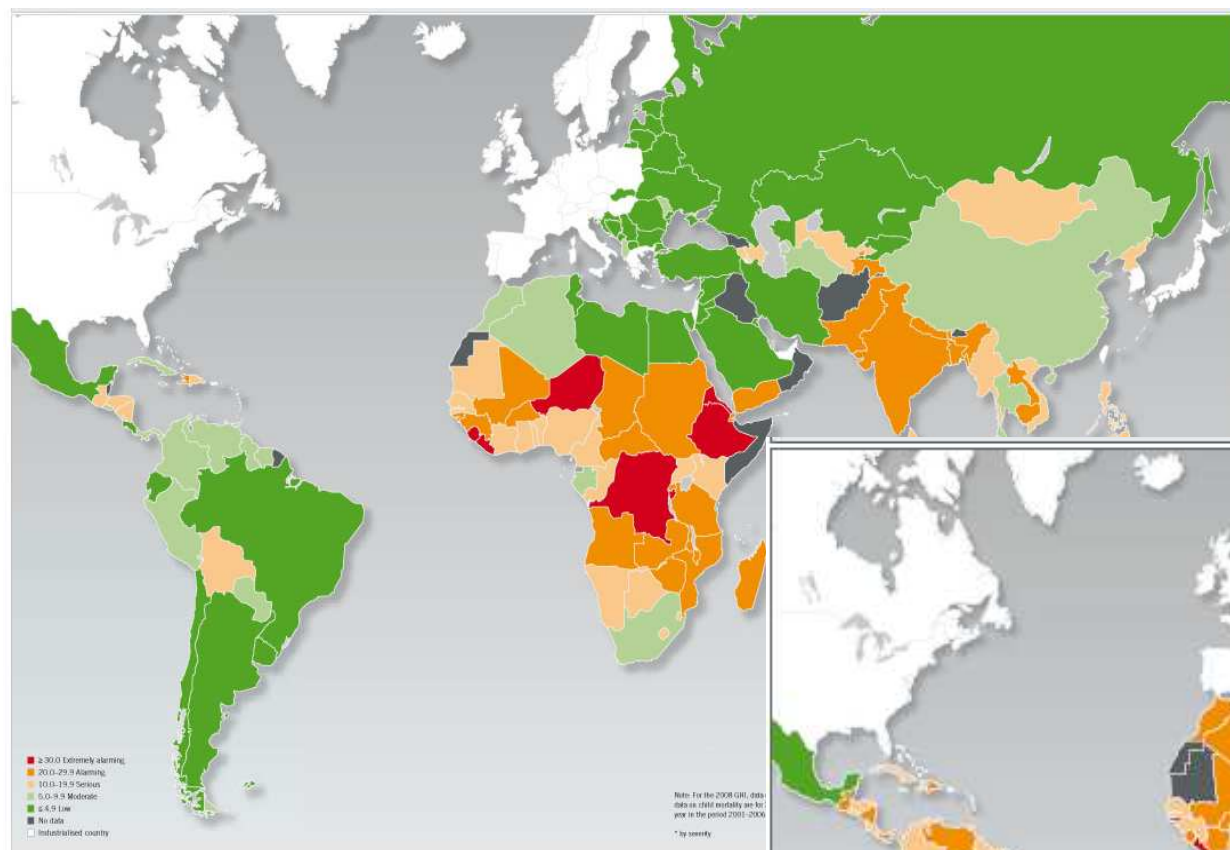
Source: IFPRI, 2008

UNREST OVER FOOD

This map records some of the worst recent violence – where people died or large numbers protested – wholly or partly in response to rising food prices. Other, lesser outbreaks occurred in West Africa. Even Wal-Mart in the United States rationed rice and Italian consumers protested over the price of pasta.

MAURITANIA
Nov. 2007: 1 killed in riots. May 2008: More violence; president sacks govt over slow response. Aug 2008: Coup ousts president.

UZBEKISTAN
Sep 2007: Food protests erupt in the capital, Tashkent, and the Fergana region.

INDIA
Sep 2007: At least 6 die in mob attacks on West Bengali rice sellers in rationing protests. Aug 2008: Food riots follow flooding in eastern India.

EGYPT
Apr 2008: 2 die in major bread riots; army is ordered to start baking bread.

HAITI
Apr 2008: Food price riots leave 4 dead. Prime minister sacked. Aug 2008: More violence erupts.

MEXICO
Jan 2007: 75,000 protest against a 400% rise in tortilla prices.

MOROCCO
300 injured in bread protests.

BANGLADESH
Apr 2008: 20,000 textile workers riot over wages and food prices.

HONDURAS
Apr 2008: Thousands of activists, students and farmers block highways and rally against high food prices and free trade.

SENEGAL
Apr 2008: 1,000 march; many with empty rice sacks.

CAMEROON
Feb 2008: Riots leave 24 dead.

YEMEN
Sep 2007: Tanks called in, 4 killed, in 5-day riots over wheat prices.

INDONESIA
Jan 2008: 3,000 rally in Jakarta to demand action on soybean price, which doubled in a year.

PERU
Feb 2008: Farmers strike. May 2008: 1,000 woman bang pots outside Congress. Jul 2008: One-day national strike.

GUINEA
Jan 2007: 130 killed in 18-day national strike.

SOMALIA
May 2008: 10s of 1,000s protest at doubling of food prices; 2 killed.

ARGENTINA
Mar–Apr 2008: 3-week farmers' strike over new export taxes on soya and other products.

SOUTH AFRICA
Aug 2008: National day of protest and strikes. 25,000 march through Johannesburg.

MOZAMBIQUE
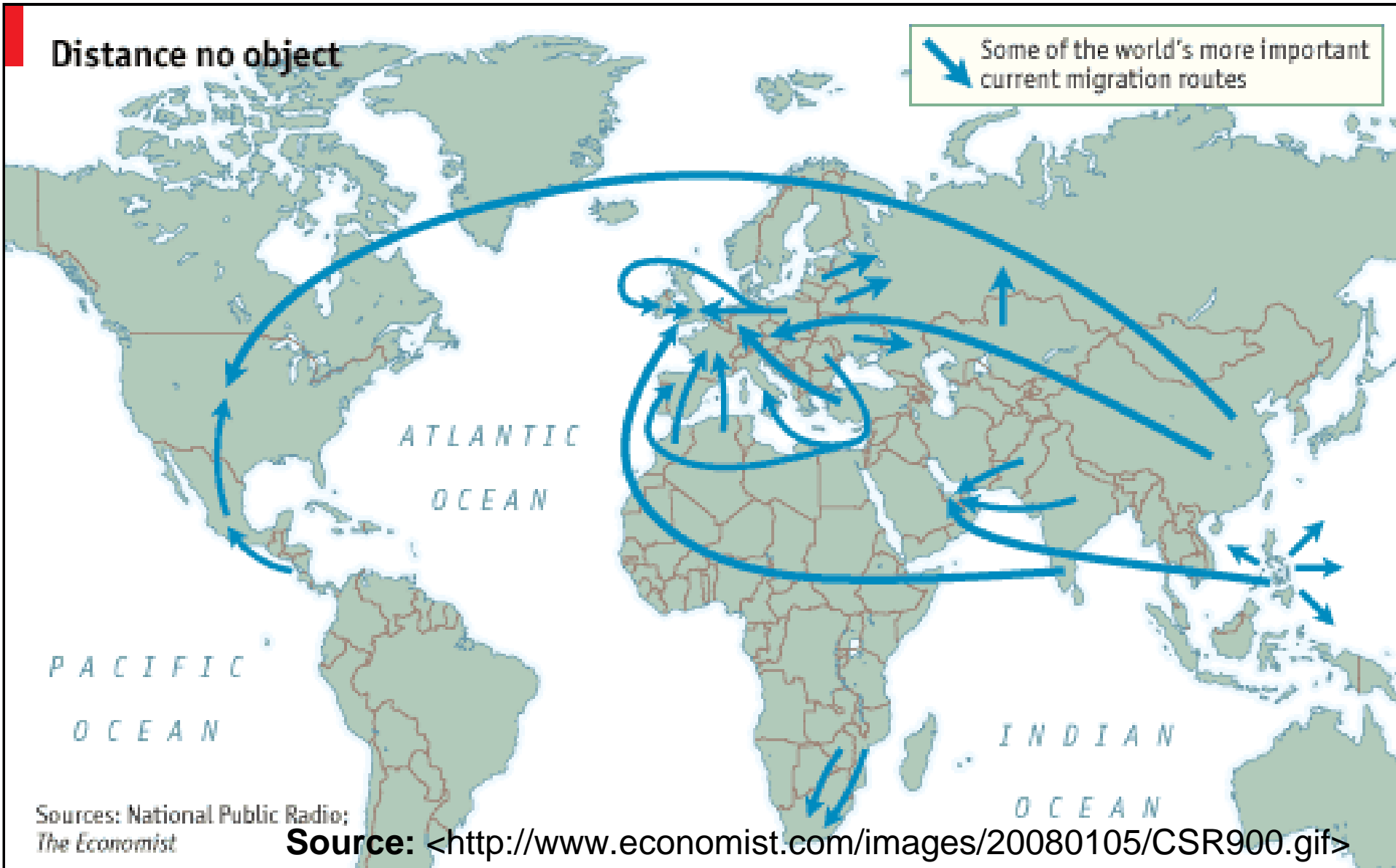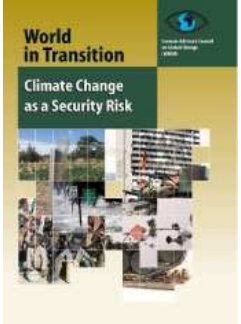Feb 2007: 6 killed in food and fuel protests.

Global net migration
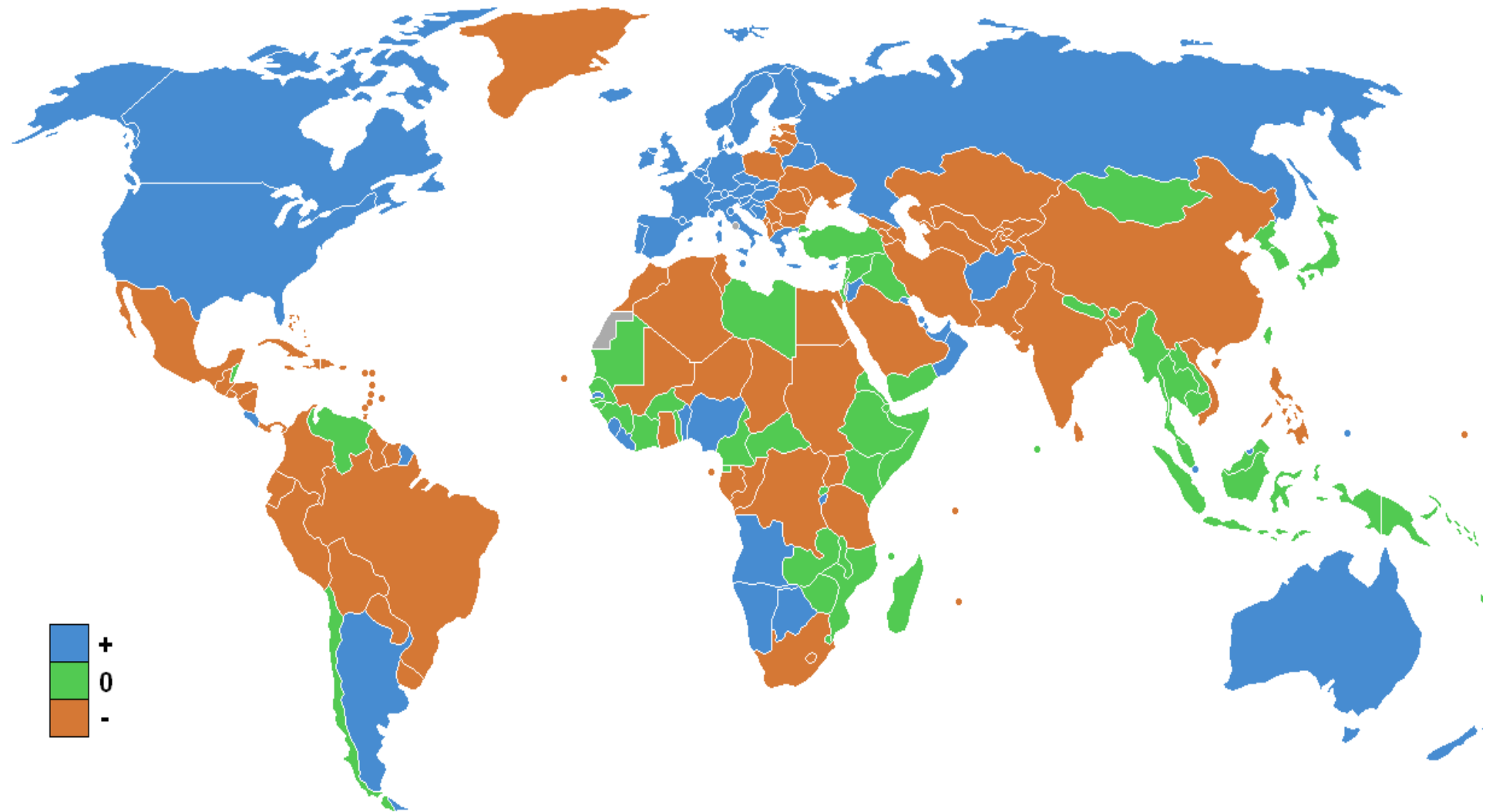
positive (blue), negative (orange). **Source:** Wikipedia, 2009

Migration currents

Distance no object
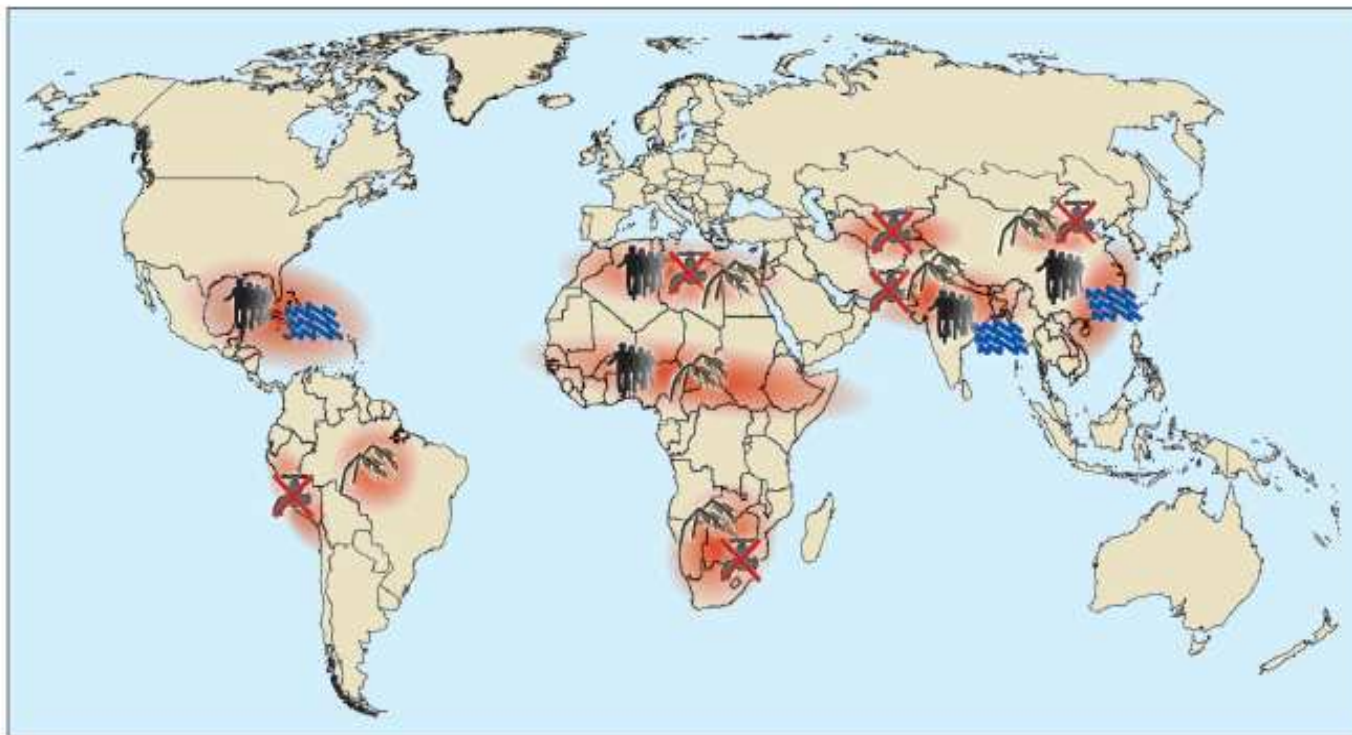
Some of the world's more important current migration routes

Source: <http://www.economist.com/images/20080105/CSR900.gif>

WBGU-study: Climate ‚Hotspots': Four Conflict Scenarios

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

Conflict constellations in selected hotspots

Climate-induced degradation of freshwater resources

Climate-induced increase in storm and flood disasters

Climate-induced decline in food production

Environmentally-induced migration

Hotspot

- **Mediterranean**
  - Water
  - Food product.
  - **Migration**
- **South, Central and East Asia**
  - Water
  - Food product.
  - **Migration**
  - cyclone
- **Latin America & Caribbean** Wasser
  - Water
  - Food product.
  - **Migration**
  - hurricanes

Environmental conflicts (1980-2006)
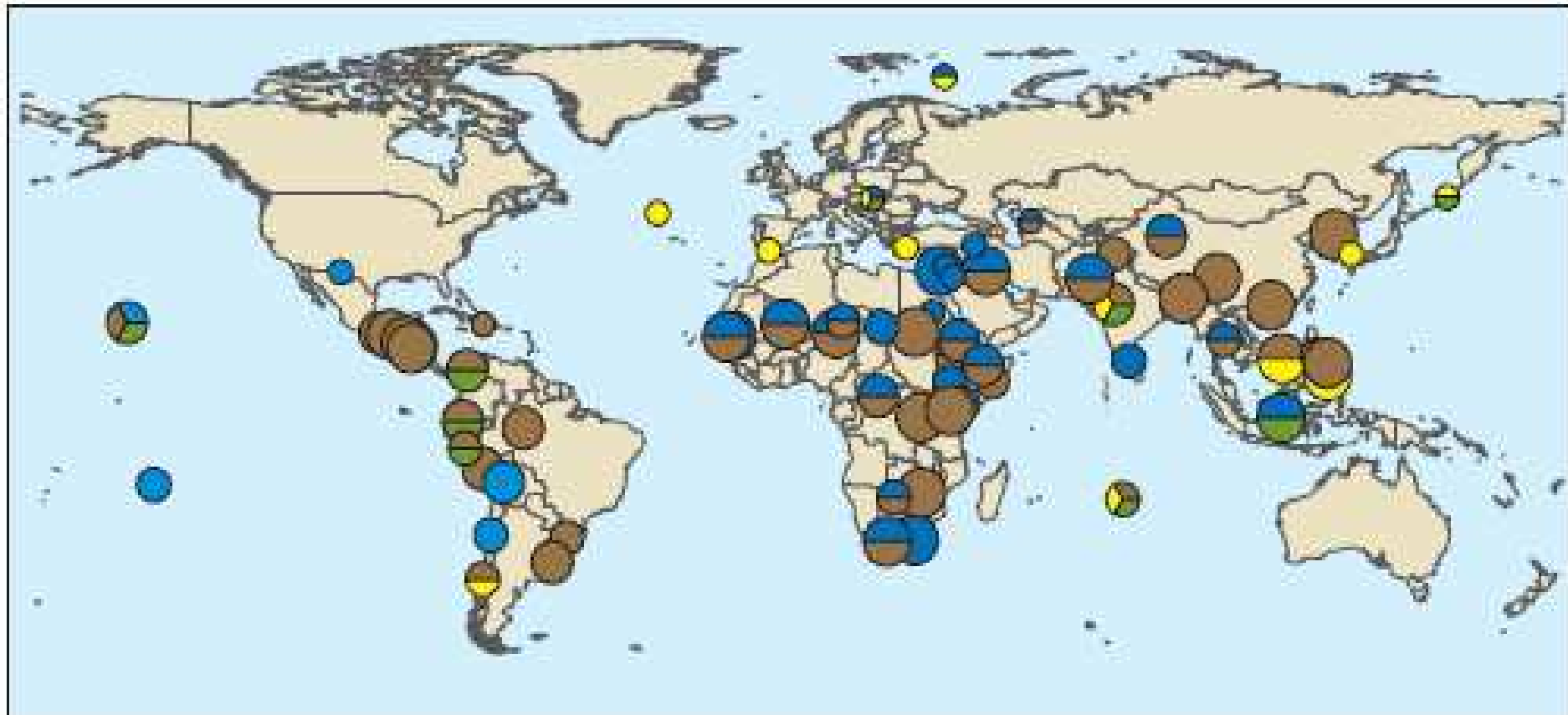
Conflict intensity
- ○ Diplomatic crisis
- ○ Protests (partly violent)
- ○ Use of violence (national scope)
- ○ Systematic/collective violence

Conflict cause

- Water
- Land/soil
- Fish
- Biodiversity

**Source:** WBGU (2008: 32)

R:Policy Response to DLDD Dangers

- **How? Responsive vs. proactive action**
  - **Reponse:** cost of non-action (Stern R.)
  - **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**
- **Dealing with Societal Outcomes**

Hexagon Series: Volumes I-V

-<http://www.afes-press-books.de/html/hexagon.htm>
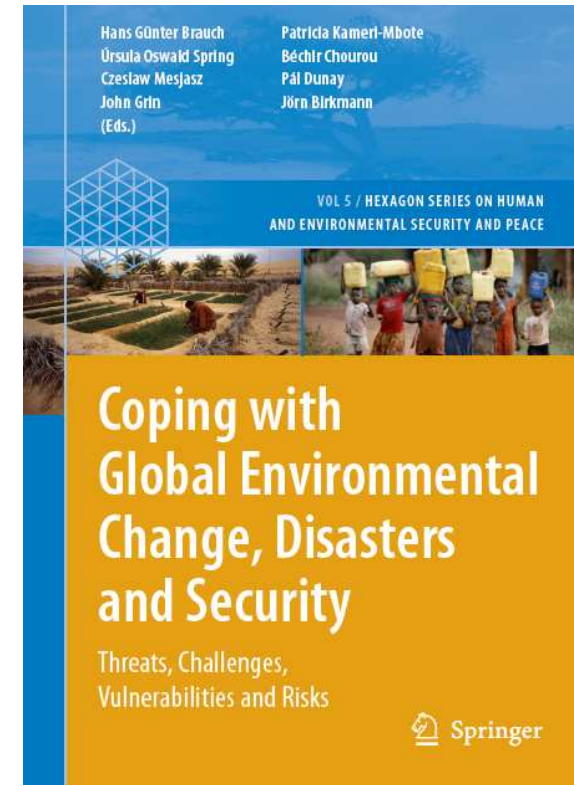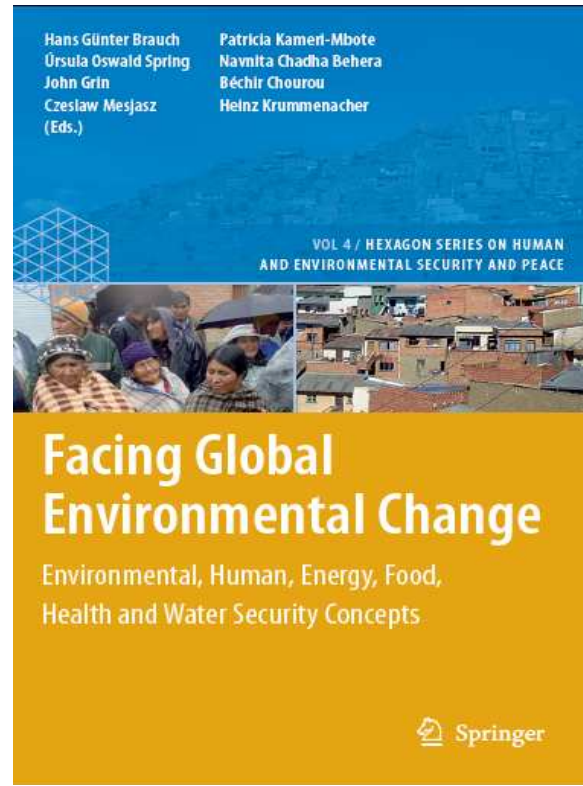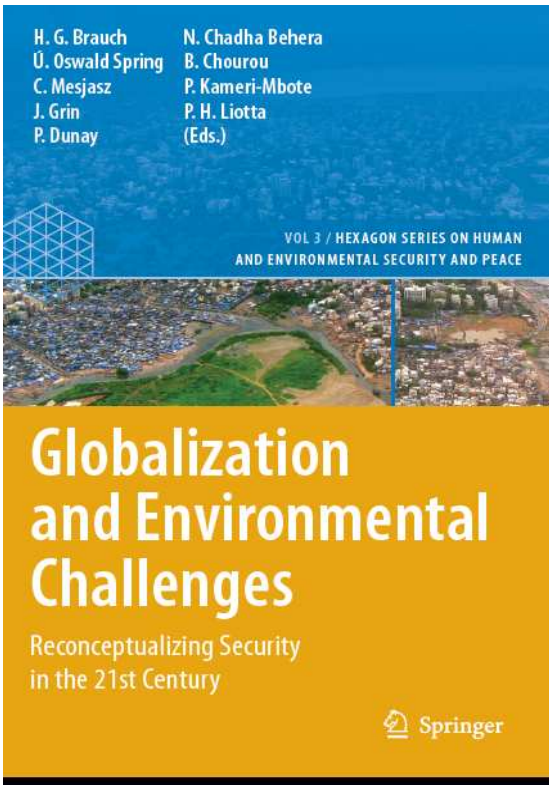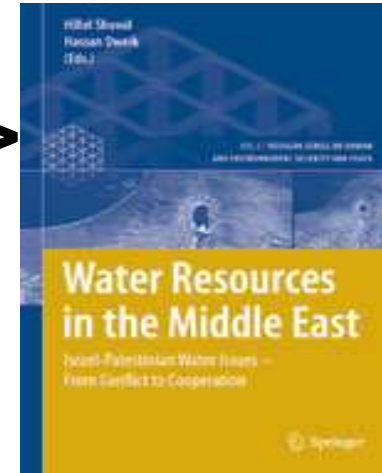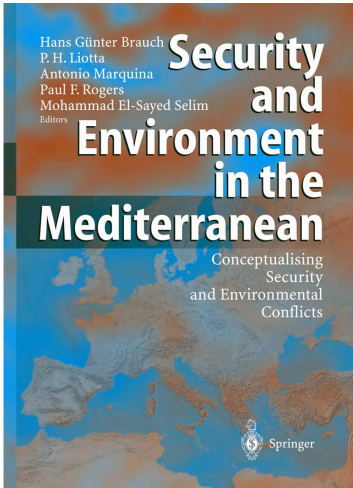
Environmental Security Handbook
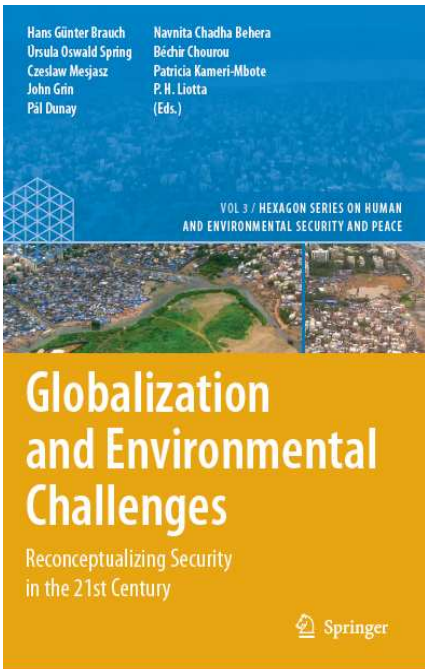
I. **Globalization and Environmental Challenges**: 92 authors, 36 countries, 16 disciplines, former vice presidents, ministers, generals, diplomats (2008)

II. **Facing Global Environmental Change:** 132 authors, 49 countries on global debate and problems of environmental, human, energy, food, health, water security (2009)
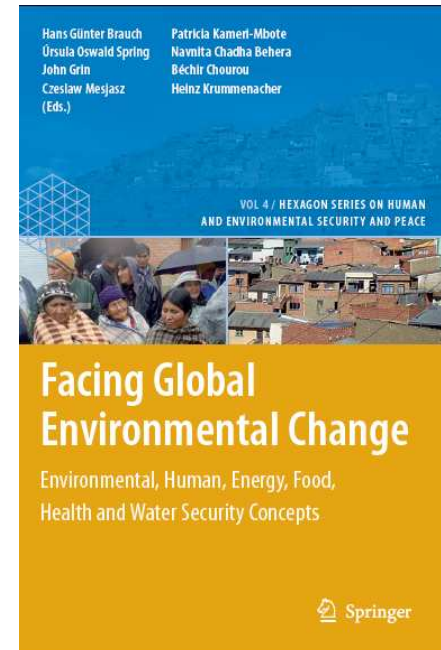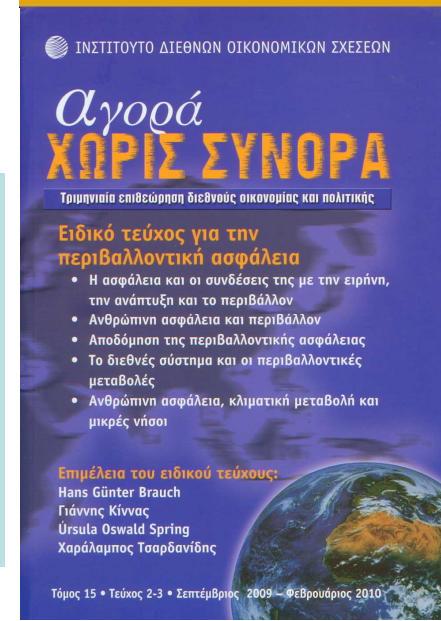
III. **Coping with Global Environ-mental Change** *Disasters and Security – Threats, Challenges, Vulnerabilities and Risks* **(2011)**

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Greek Editions of Vol.1 & 2 **AGORA 2010**

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