

Climate Change and Violent Conflict



Universität Hamburg



Jürgen Scheffran

Institute for Geography, KlimaCampus, Hamburg University

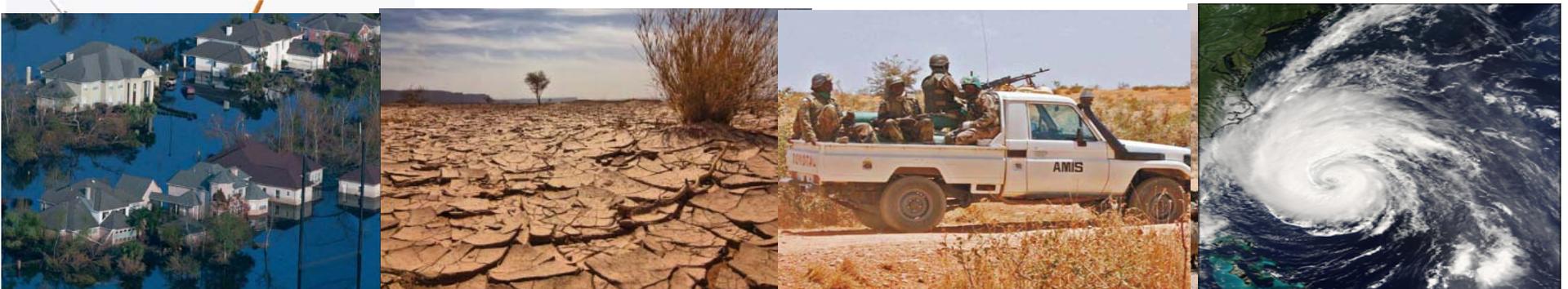
Research Group Climate Change & Security

clisec.zmaw.de

Copenhagen Klimaforum at COP-15

Side event: “Climate Change and Conflict”

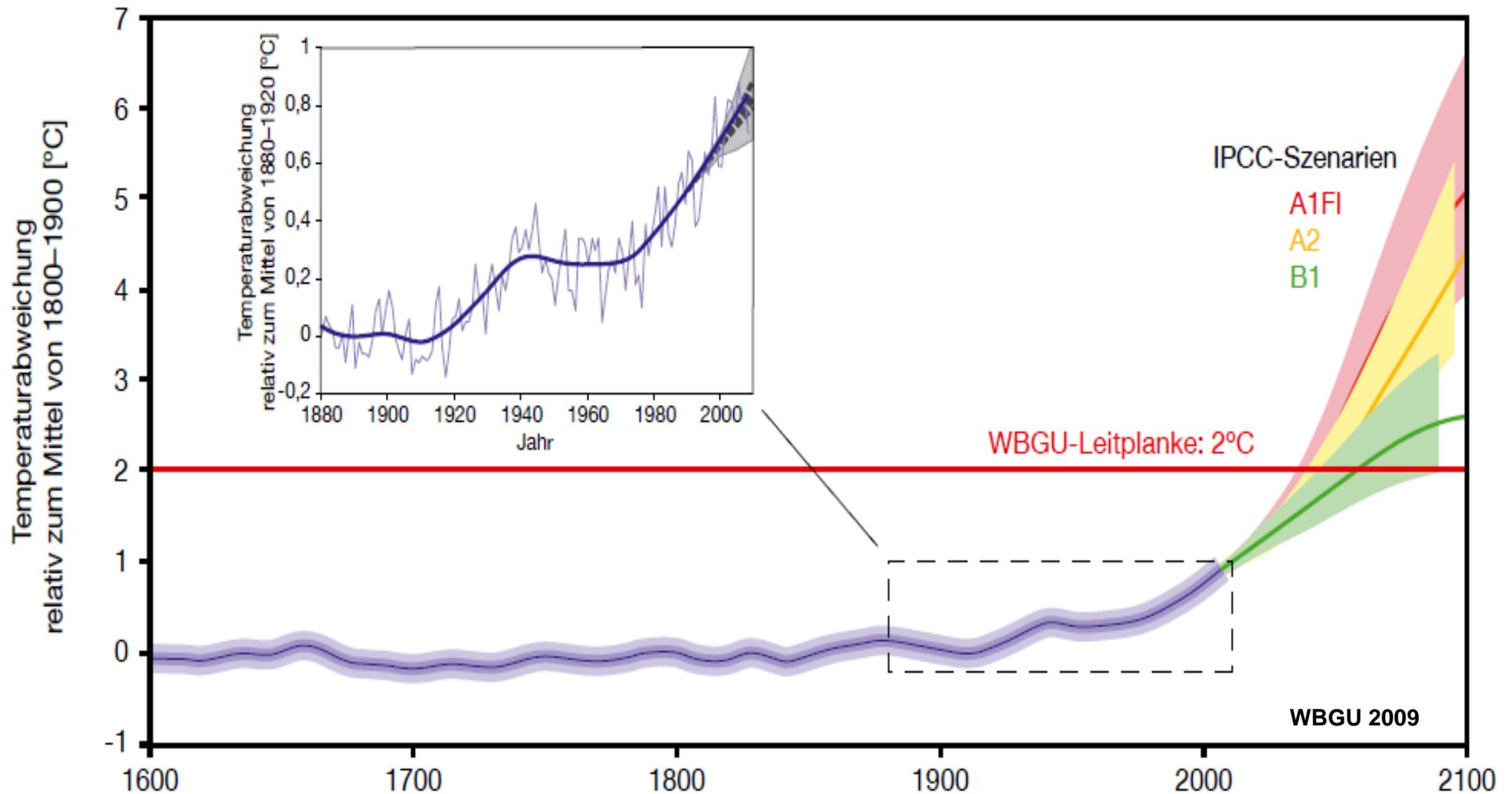
December 13, 2009



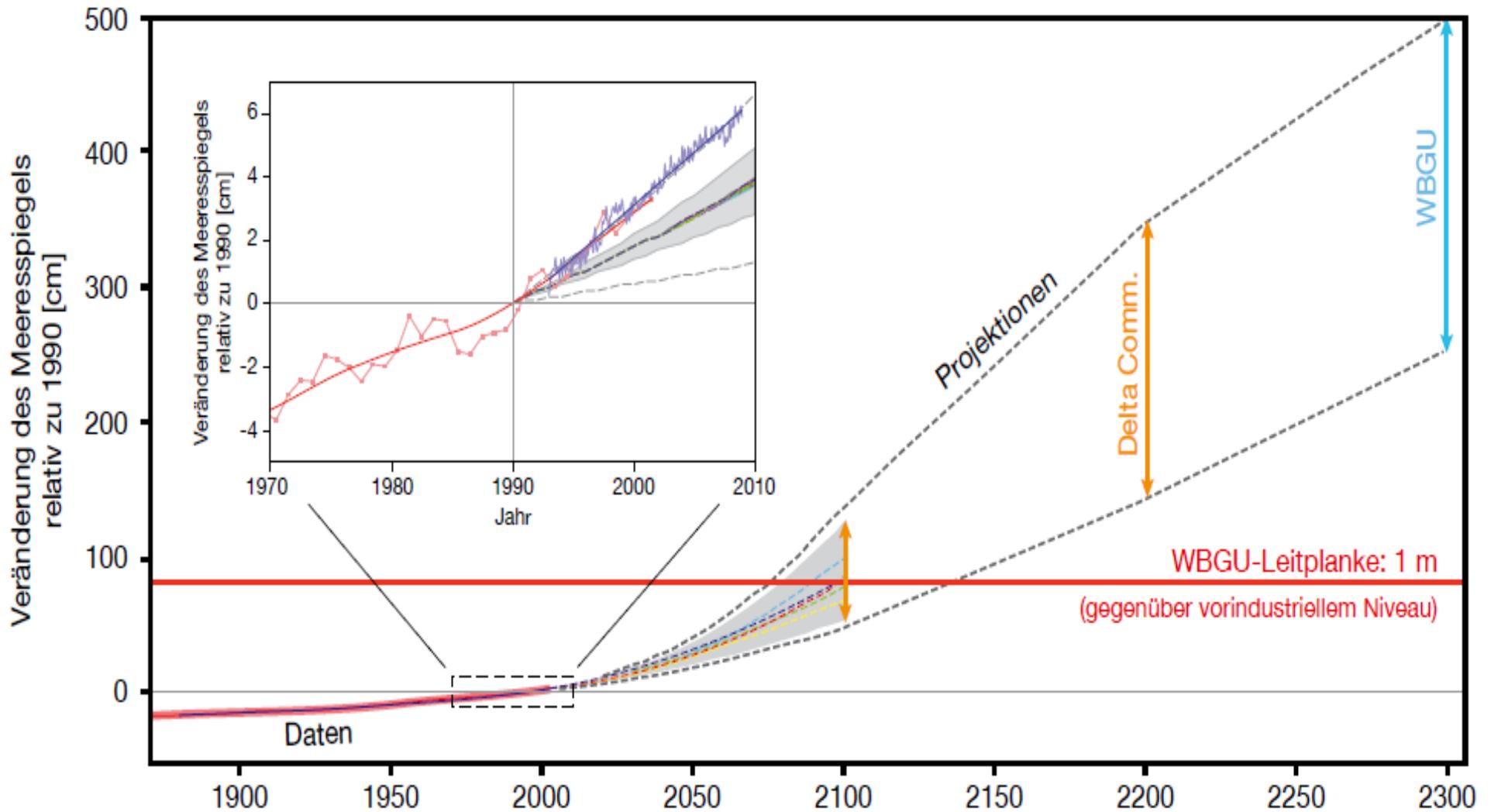
Overall questions

- Are natural resources a relevant conflict factor?
- Which regions will be affected by global environmental change and how do different factors combine?
- Will climate change lead to more societal instabilities and conflicts or to more cooperation?
- How do human beings and societies respond to climate change?
- What are appropriate strategies for the prevention of security risks, the management of environmental conflicts and the stabilization of societies?

Projections of global mean temperature



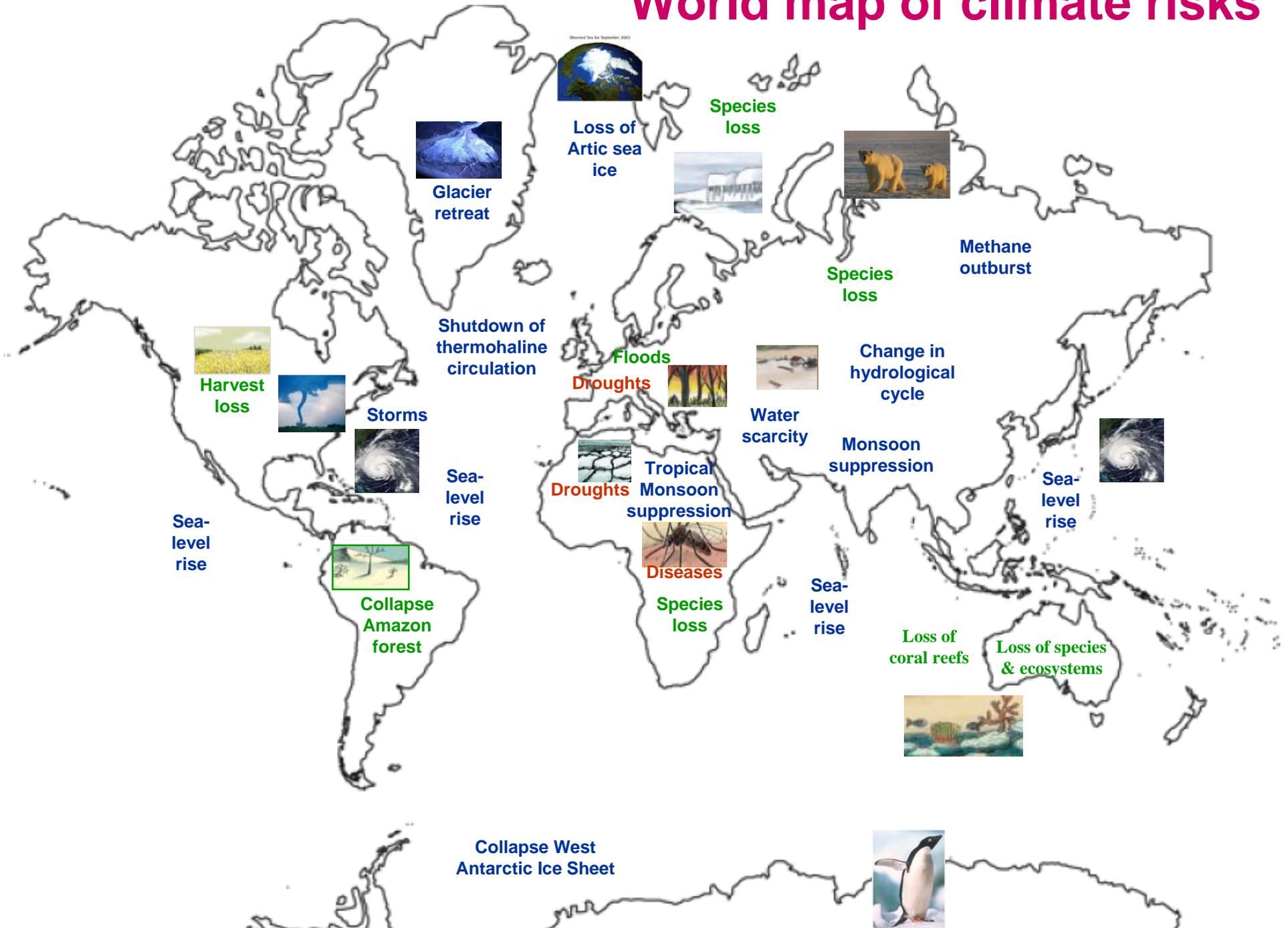
Projection of sea-level rise



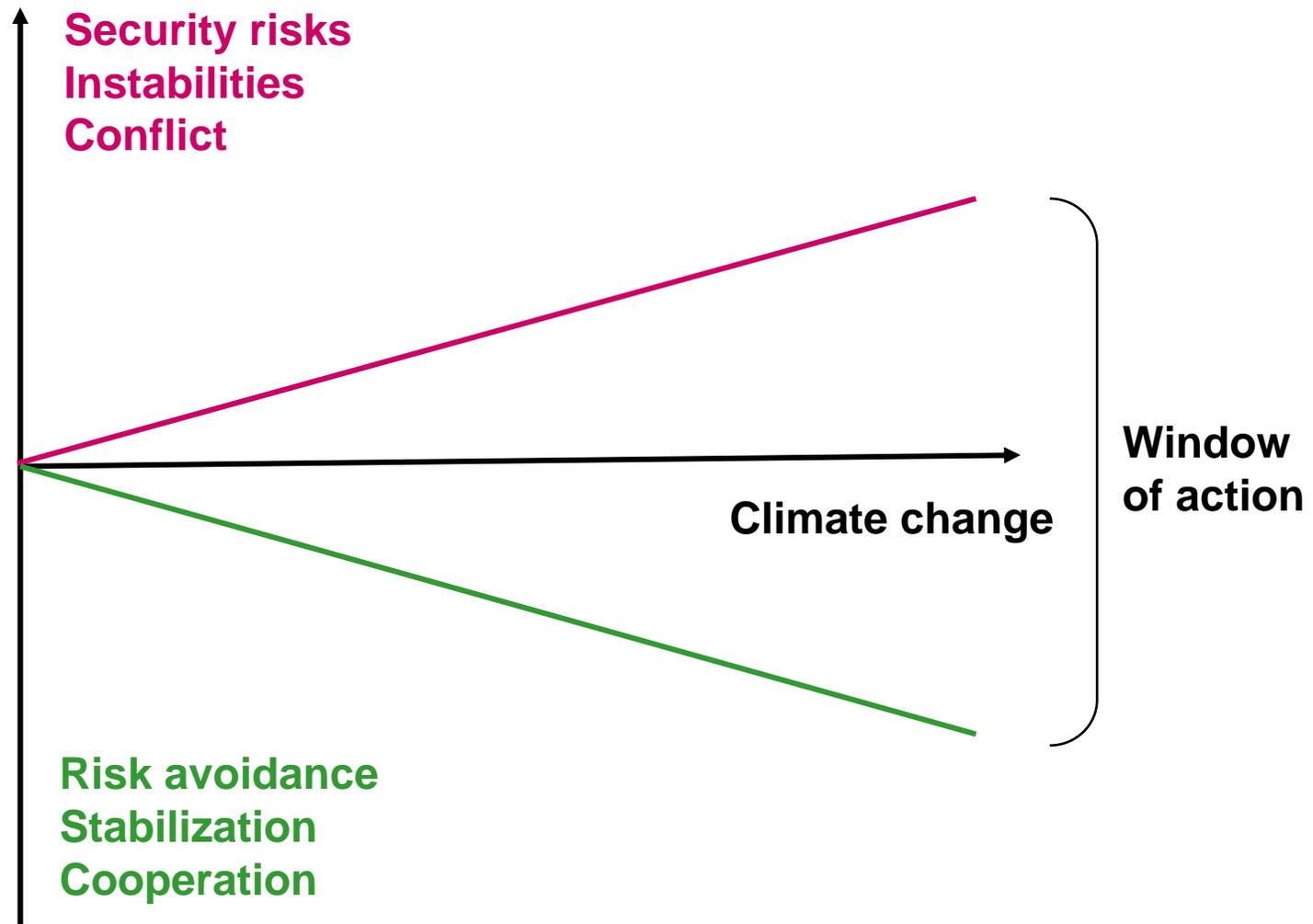
Vulnerability of coastal population against sea-level rise



World map of climate risks



How will human beings and societies respond?



Is climate change a security risk?



Security risks of climate change

Climate change may “pose as much of a danger to the world as **war.**” (UN Secretary General Ban Ki-Moon)

Climate change is characterized as a “**threat multiplier**” in already fragile regions of the world, exacerbating conditions that lead to failed states — the breeding grounds for extremism and terrorism. (National Security and the Threat of Climate Change, April 2007)

Security risks of climate change

German Advisory Council on Global Change (2007)

Without resolute counteraction, climate change will overstretch many societies' adaptive capacities within the coming decades, which could result in **destabilization and violence**, jeopardizing national and international security to a new degree.

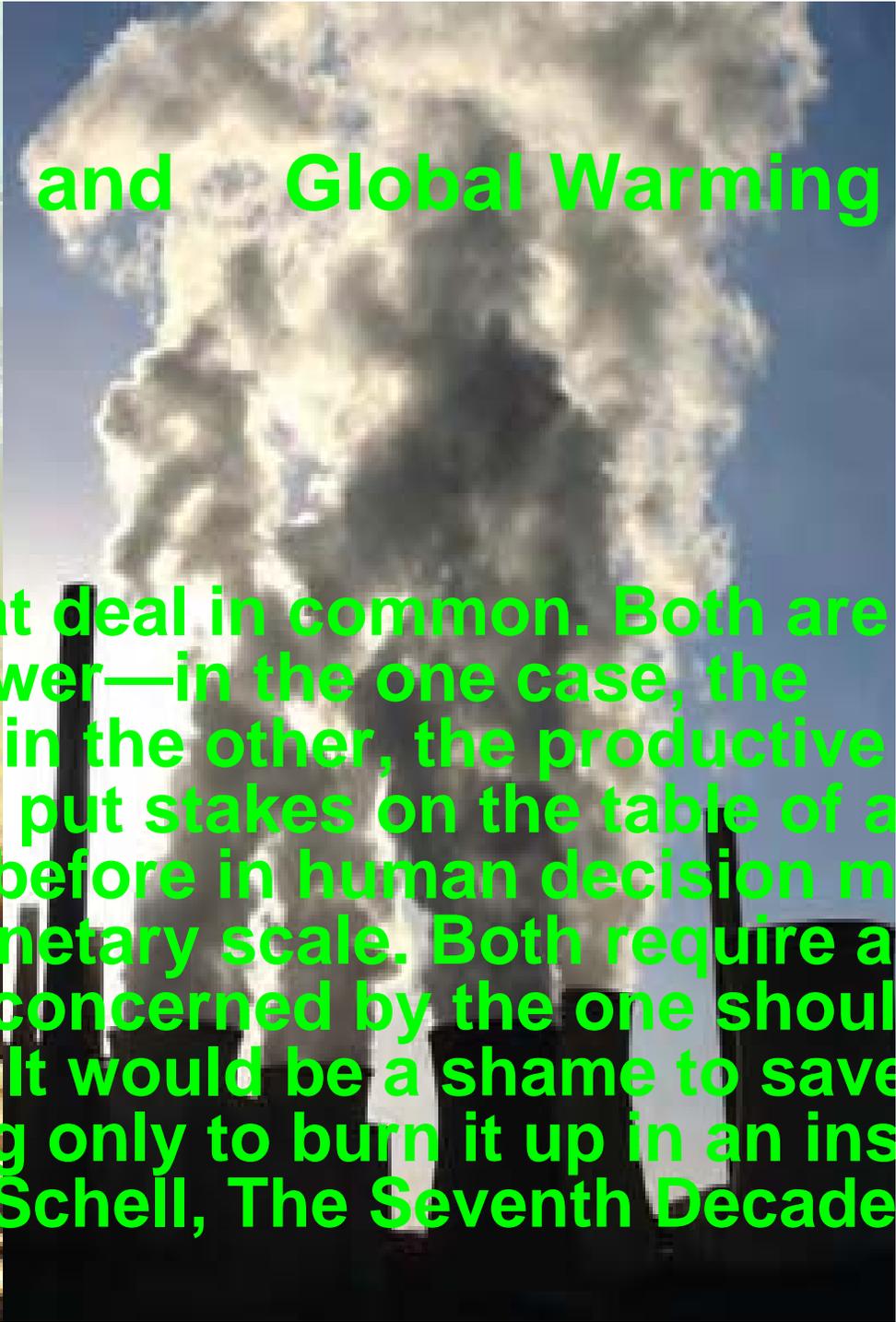
Climate change could also unite the international community to set the course for avoidance of dangerous anthropogenic climate change by adopting a dynamic and globally **coordinated climate policy**.

If it fails to do so, “climate change will draw ever-deeper lines of **division and conflict** in international relations, triggering numerous conflicts between and within countries over the distribution of resources, especially water and land, over the management of migration, or over compensation payments between the countries mainly responsible for climate change and those countries most affected by its destructive effects.”

Conflicts may spread to neighbouring states, e.g. through refugee flows, ethnic links, environmental resource flows or arms exports. Spillover effects can destabilize regions and expand the geographical extent of a crisis, overstretching global and regional governance.



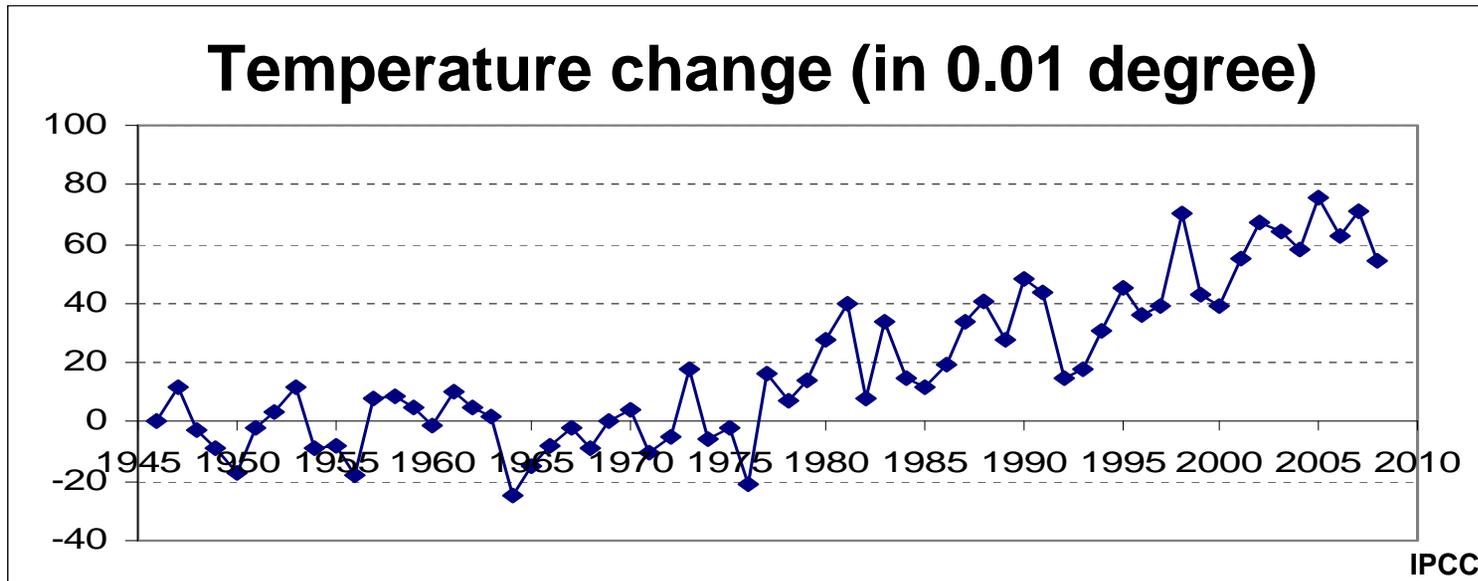
Nuclear Threats



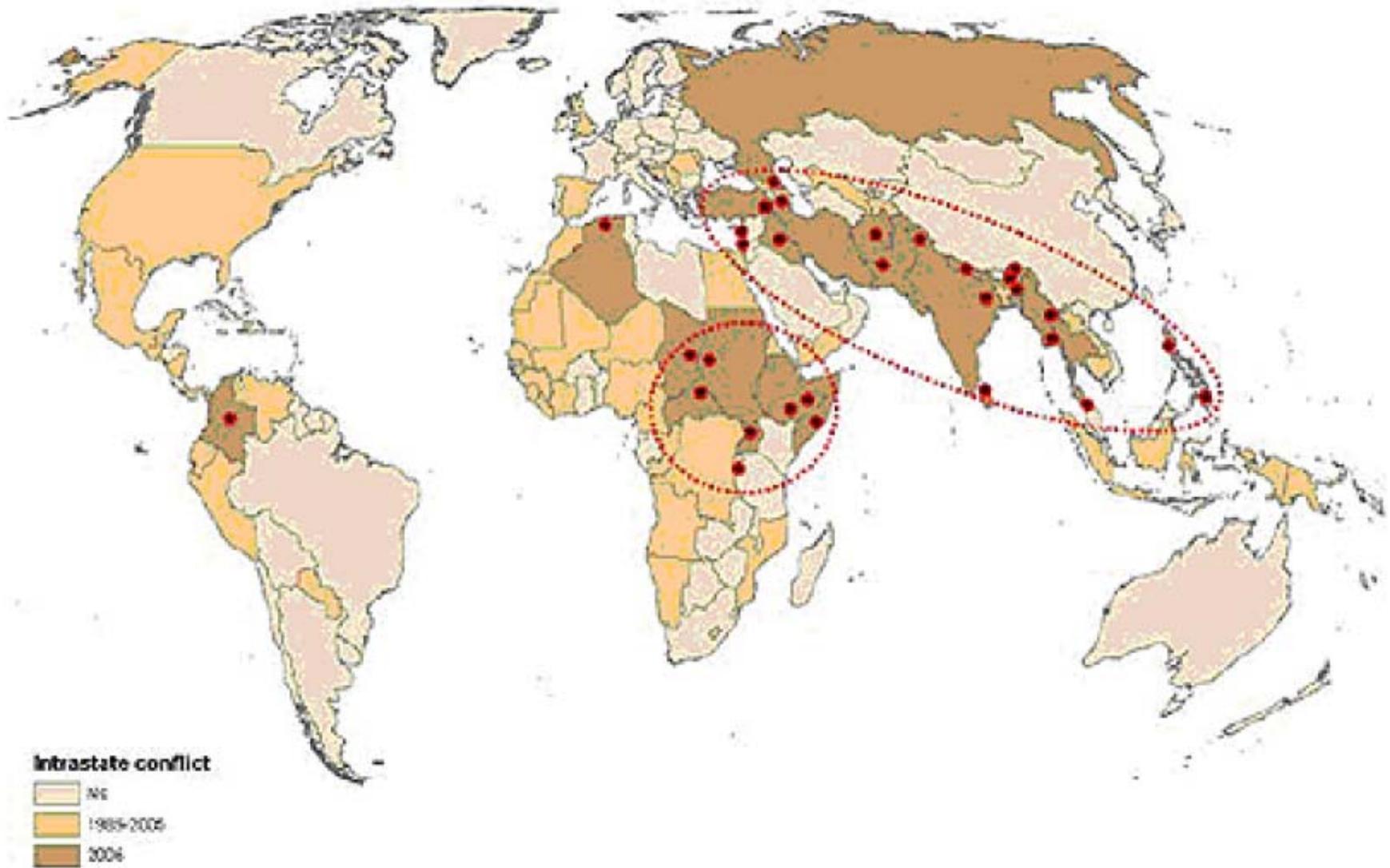
and Global Warming

The two perils have a great deal in common. Both are fruit of swollen human power—in the one case, the destructive power of war; in the other, the productive of fossil-fuel energy. Both put stakes on the table of a magnitude never present before in human decision making. Both threaten life on a planetary scale. Both require a global response. Anyone concerned by the one should be concerned with the other. It would be a shame to save Earth from slowly warming only to burn it up in an instant in a nuclear war.” Jonathan Schell, *The Seventh Decade*

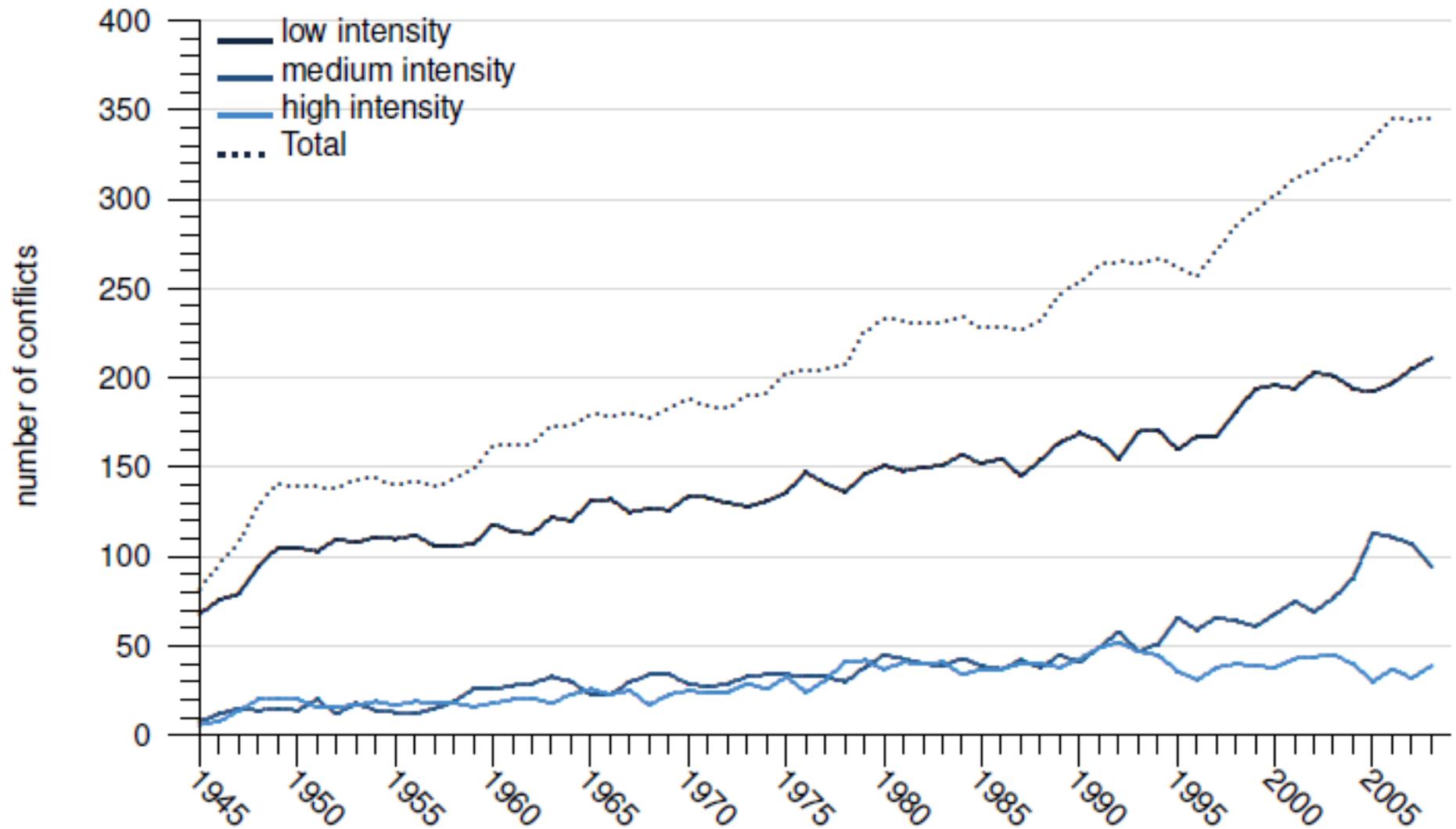
Can the link between climate change and conflict be empirically justified?



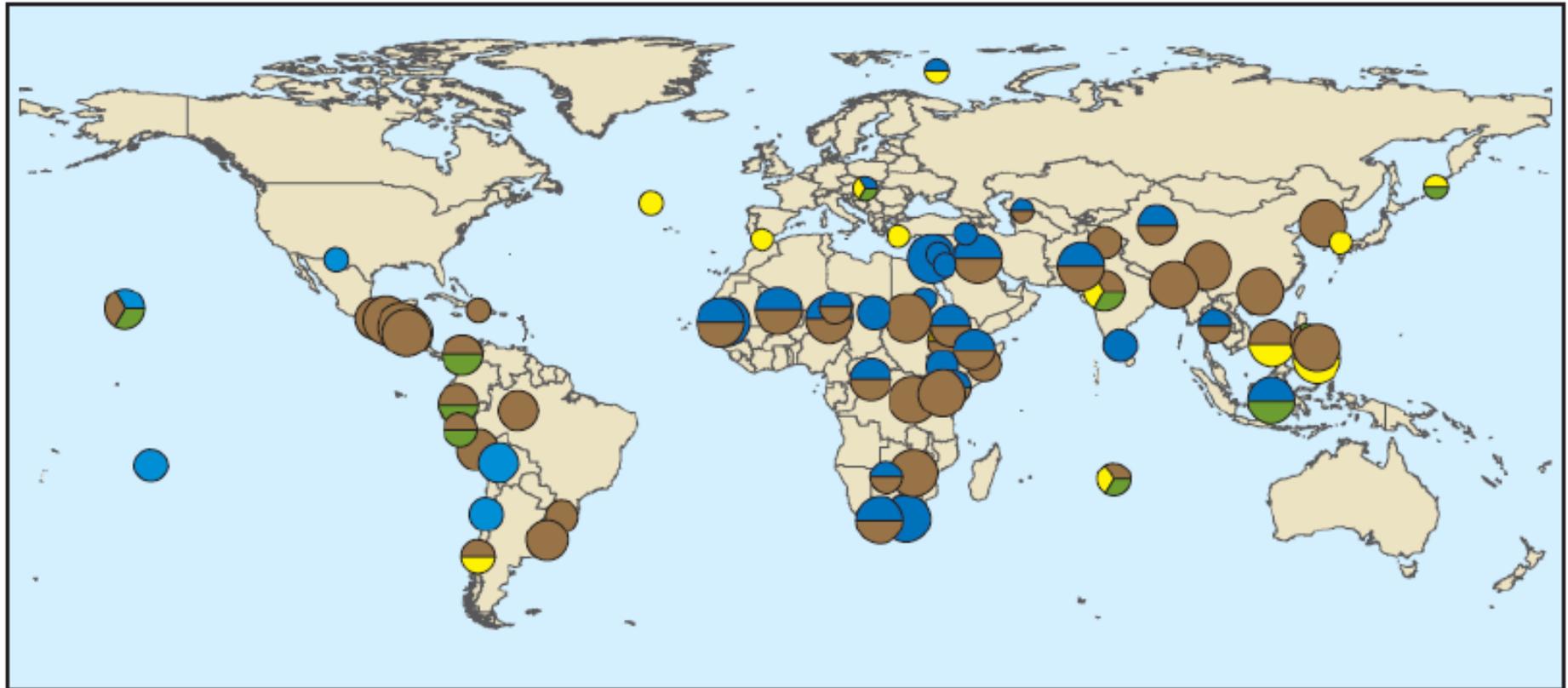
Armed conflicts in 2006



Global conflicts of low, medium and high Intensity 1945 to 2008



World map of environmental conflicts (1980–2005): Causes and intensity



Conflict intensity

- Diplomatic crisis
- Protests (partly violent)
- Use of violence (national scope)
- Systematic/collective violence

Conflict cause

- Water
- Land/soil
- Fish
- Biodiversity

Source: Carius et al., 2006

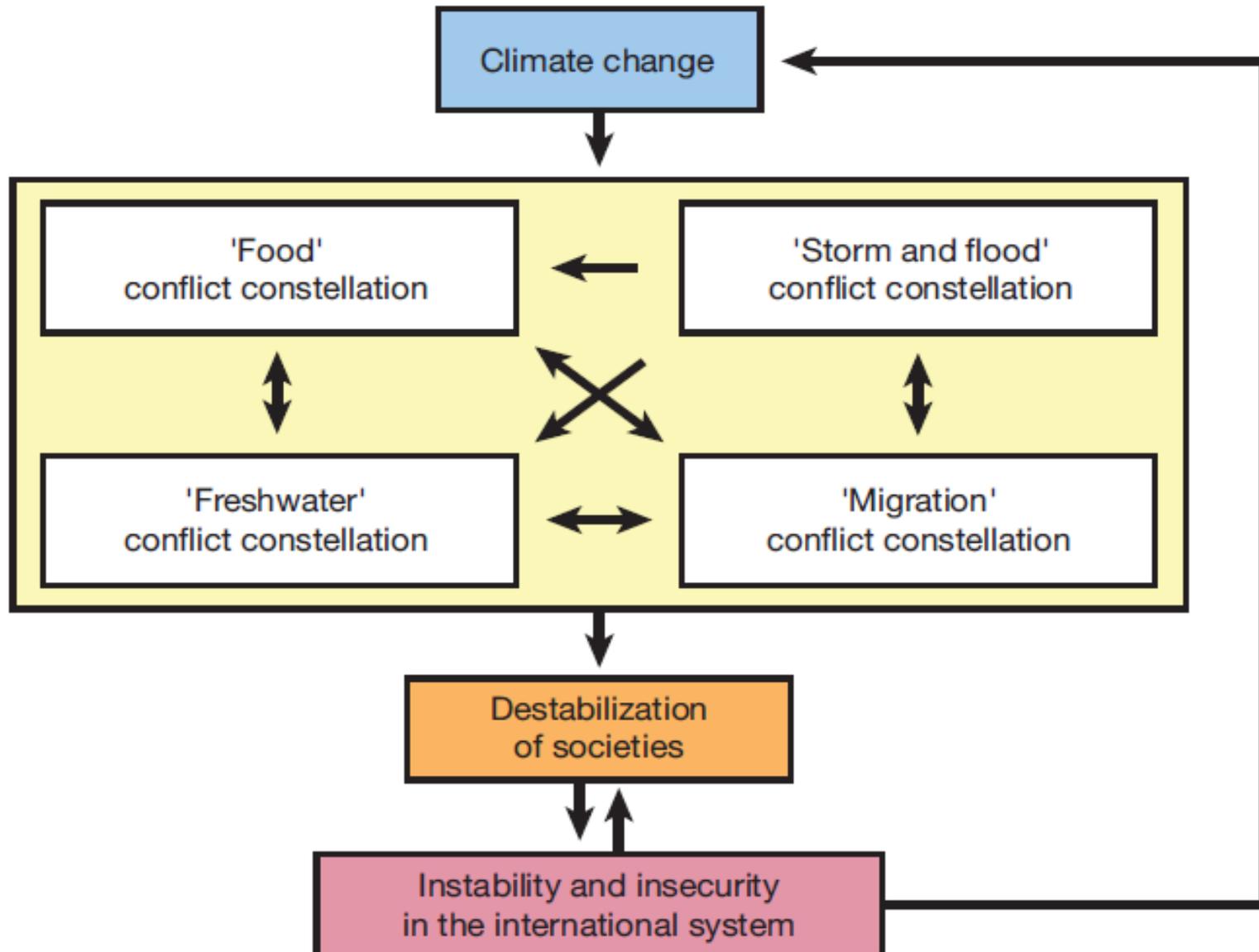
Climate-induced conflict constellations

Conflict constellations: “causal linkages at the interface between the environment and society, which interact dynamically and are capable of inducing social destabilization or violence.”

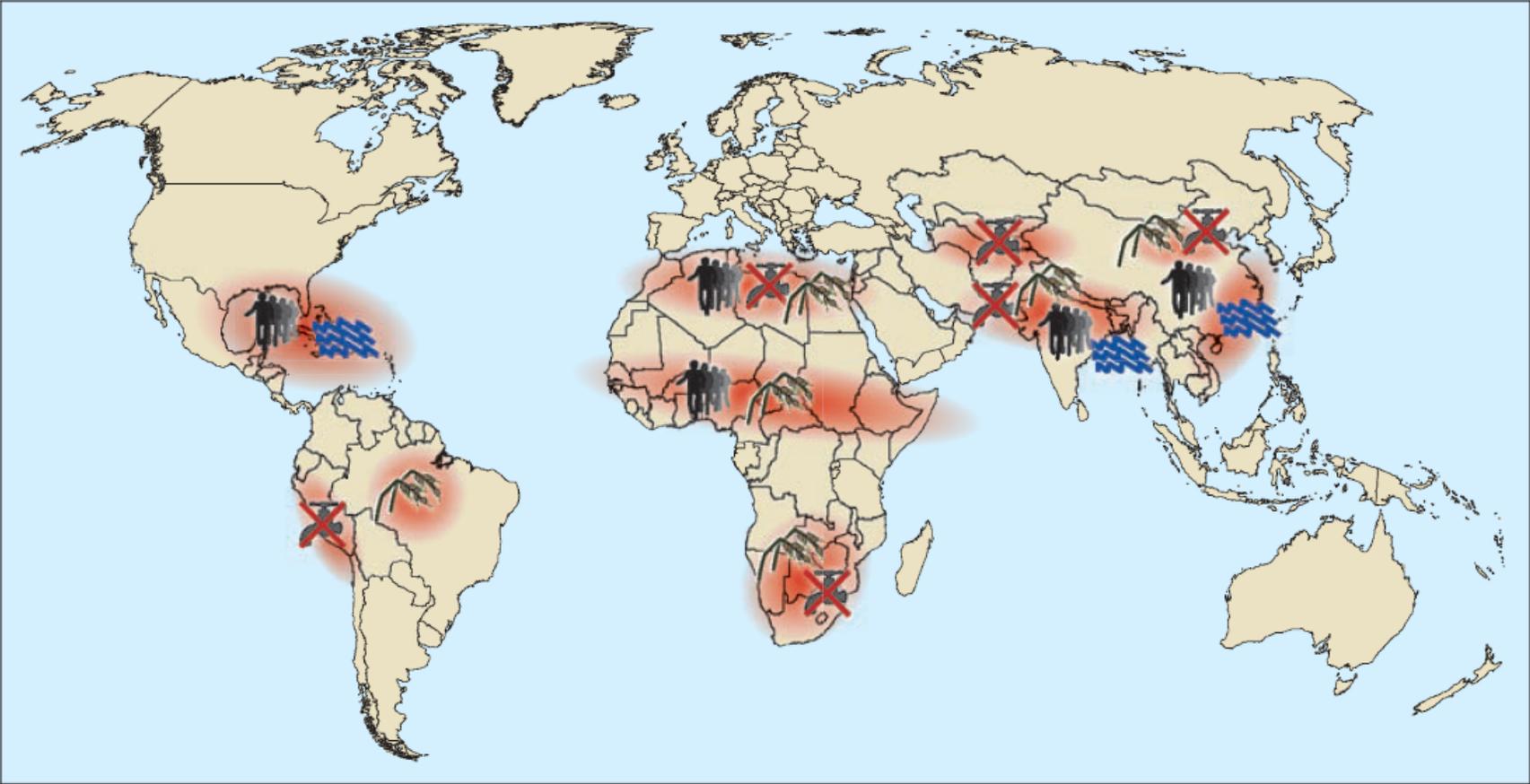
1. Degradation of freshwater resources
 2. Climate-induced decline in food production
 3. Increase in storm and flood disasters
 4. Environmentally induced migration
- Trigger or amplify conflicts and social destabilization?

(Source: WBGU 2007)

Conflict constellations as drivers of international destabilization



Conflict constellations in climate hotspots



Conflict constellations in selected hotspots

 Climate-induced degradation of freshwater resources

 Climate-induced decline in food production

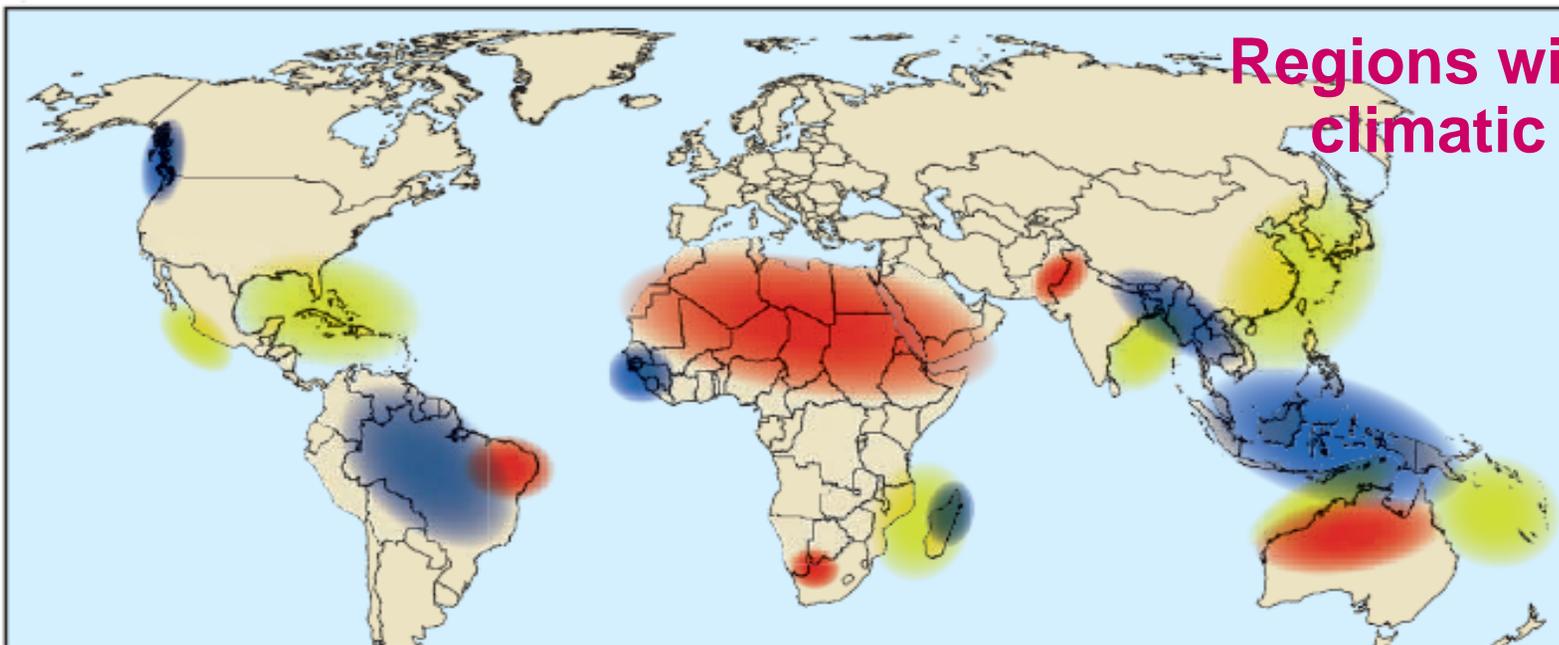
 Hotspot

 Climate-induced increase in storm and flood disasters

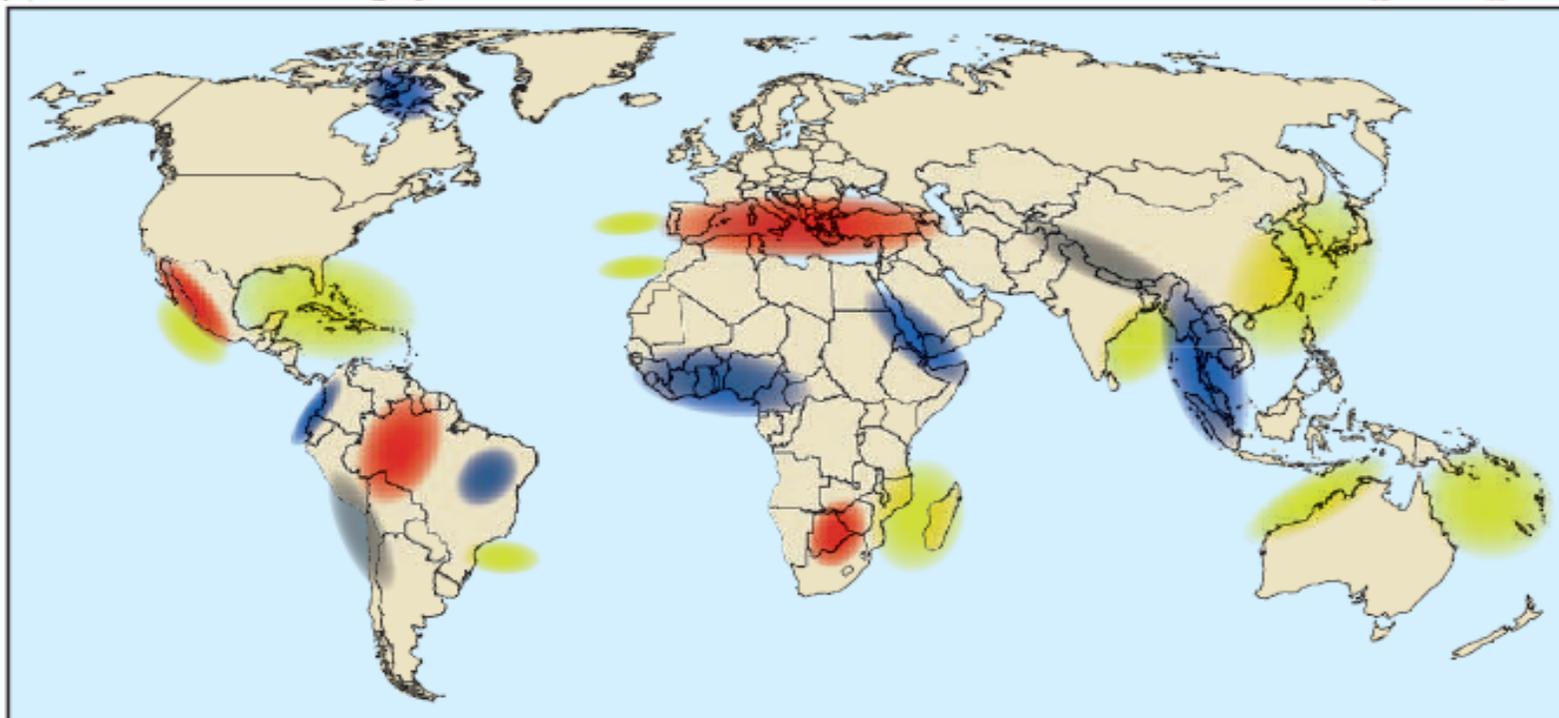
 Environmentally-induced migration

Source: WBGU 2007

Regions with extreme climatic conditions



Today



Future

 Drought  Tropical storms  Extreme precipitation  Glacier melt

Water stress

Water stress: availability of and access to water; exposure to water-related hazards, such as floods, droughts or ill-health.

More than one billion people without access to clean water

About a quarter of world population lives in water-stressed areas

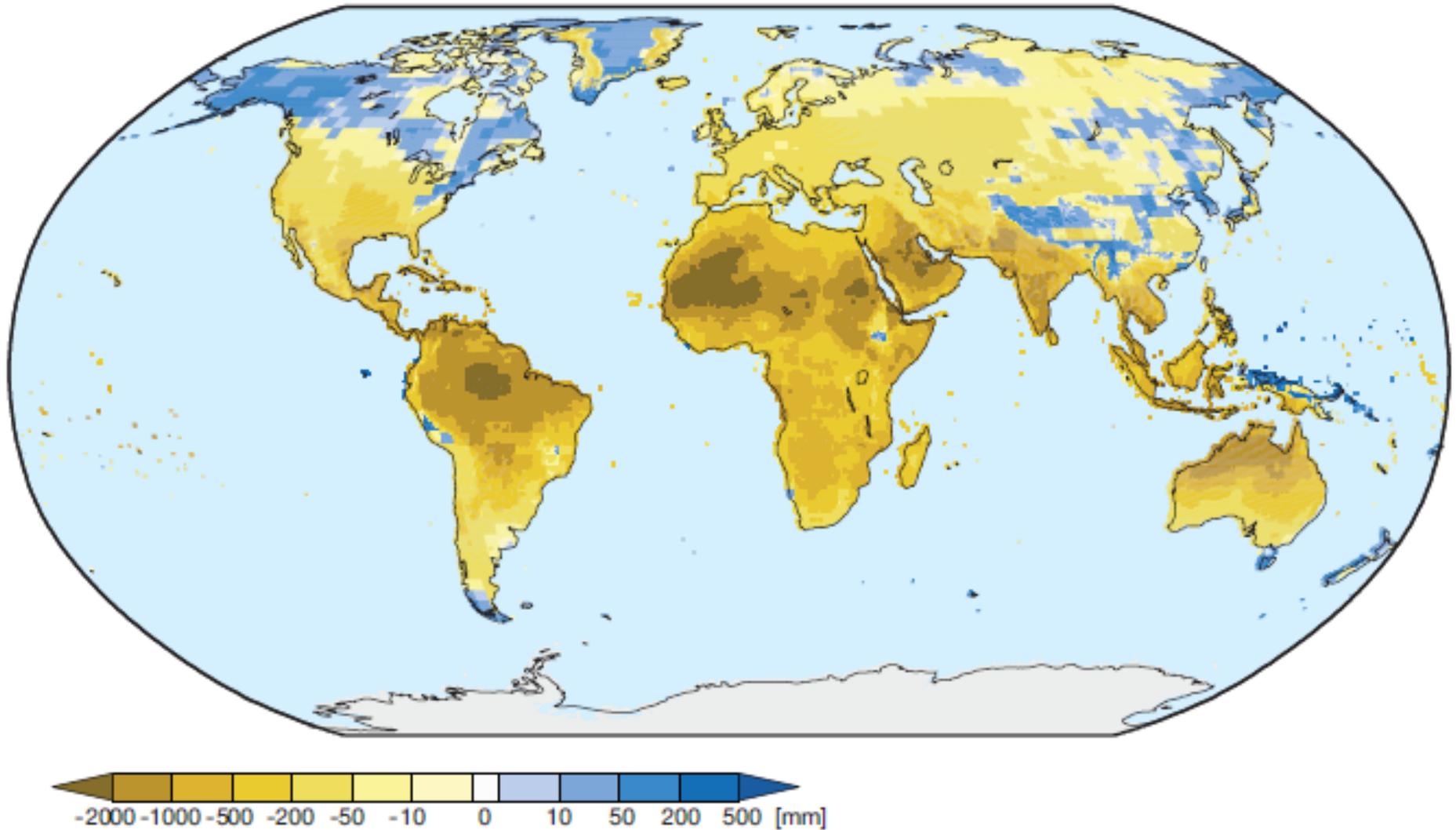
Increasing population densities, changing patterns of water use and growing economic activities increase water pressures

Climate change will alter magnitude and timing of water stress, affect agriculture output (circa 80% of agriculture is rainfed), and worsen water pollution, human health and economic wealth.

Dry areas in Sub-Saharan Africa, South Europe, Central China, among others, could experience a shift of climate zones, with increased risks of water shortage, droughts and desertification.

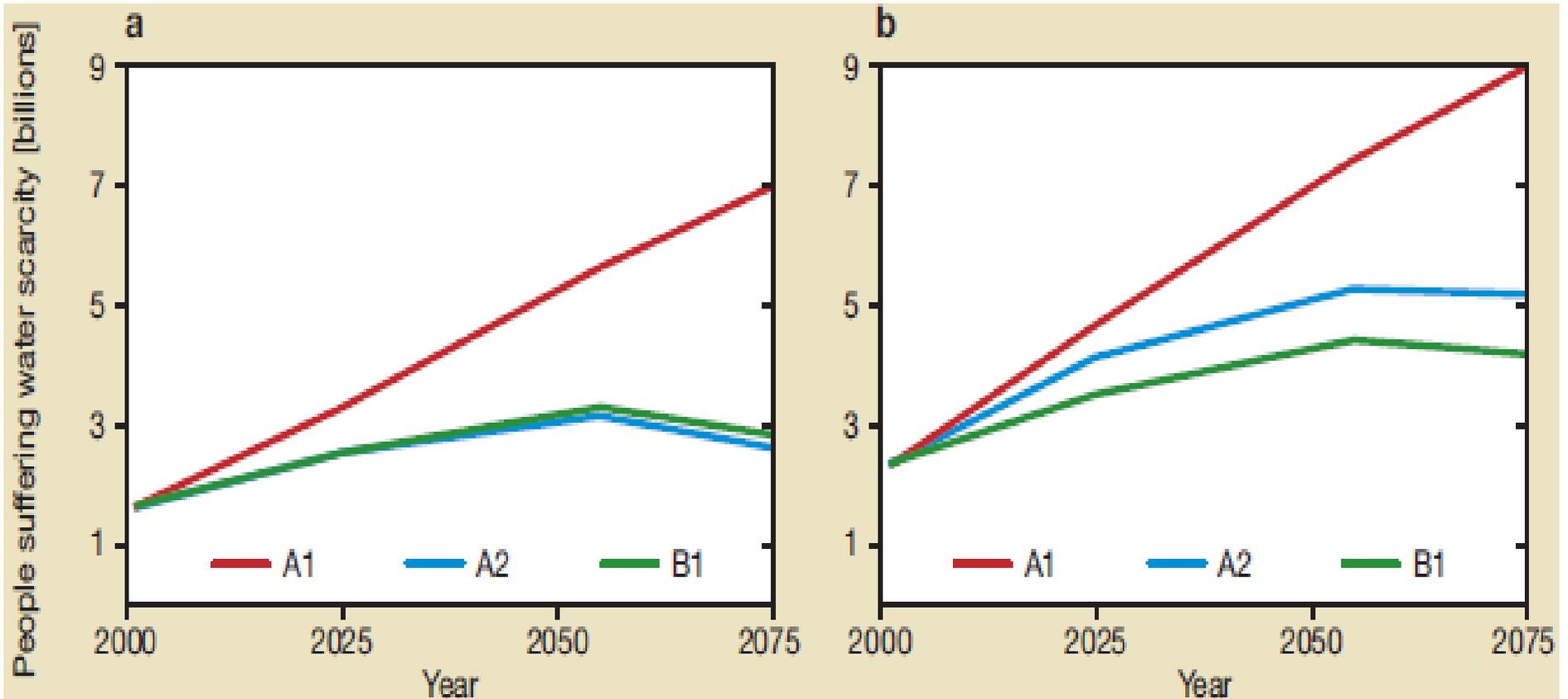
Agriculture will compete with urban areas and other business sectors for water supplies.

Future dynamics of drought risk (2041–2070 compared to 1961–1990)



Absolute changes in climatic water balance between periods

Projections of populations suffering severe water stress



a) Falkenmark indicator:
available water amount < 1,000m³/capita

b) Quotient between water withdrawal
and available amount > 0.4.

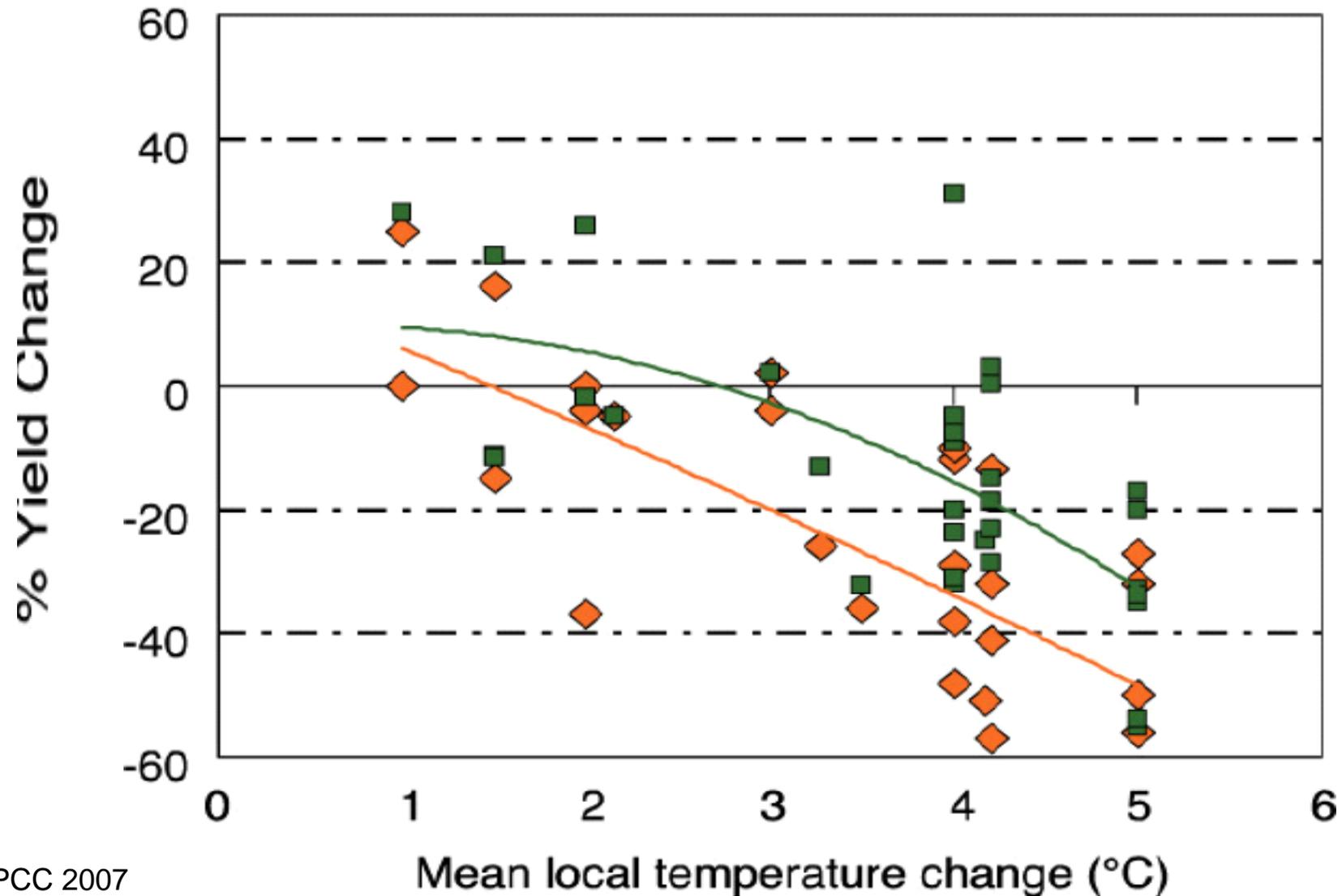
A1, A2, B1: IPCC/SRES scenarios

Water use: conflict or cooperation?

- Water scarcity undermines human security and heightens competition for water and land resources, undermining living conditions of communities.
 - Uneven water distribution: migration or resource capture in neighbour region
 - Disadvantaged groups could seek to displace another group from water-rich territory or water-rich region could secede from central government control.
 - Shared freshwater resources: overwhelmingly cooperative, rare violent conflict far outweighed by international water agreements.
 - Greatest water stress in countries without political and institutional framework for crisis management and conflict resolution.
- Complex causal relationship between hydro-climatology and water-related political relations which depends on socioeconomic conditions and institutional capacity

Sensitivity of cereal yield to climate change

(d) Wheat, low latitude



Land use and food security

More than 850 million people undernourished, and agricultural areas overexploited in many parts of the world.

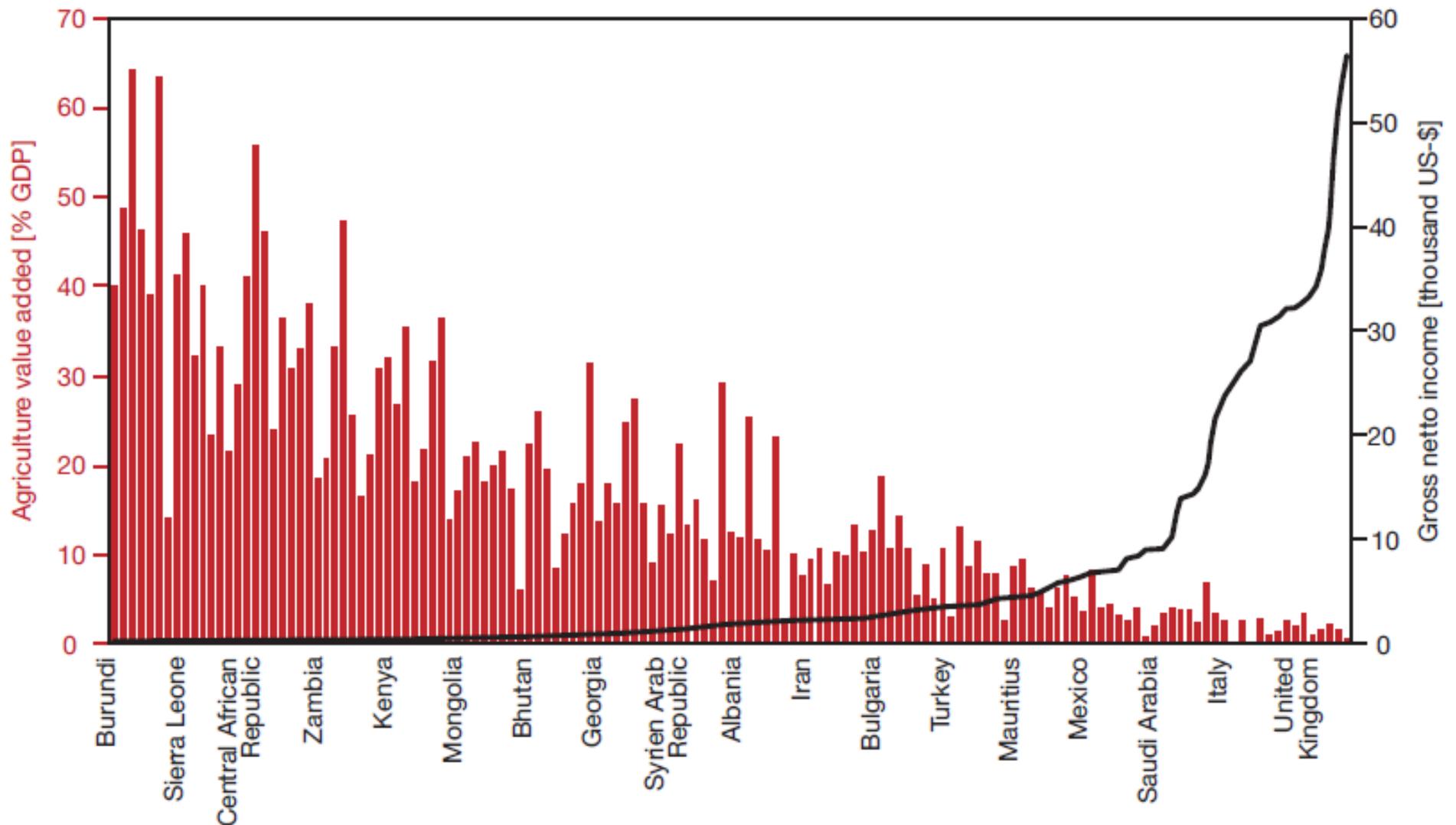
Climate change will likely reduce crop productivity and worsen malnutrition and food insecurity; significant variations from region to region.

Global warming of 2-4 °C decreases agricultural productivity worldwide and reinforced by desertification, soil salinization, and water scarcity (WBGU 2007).

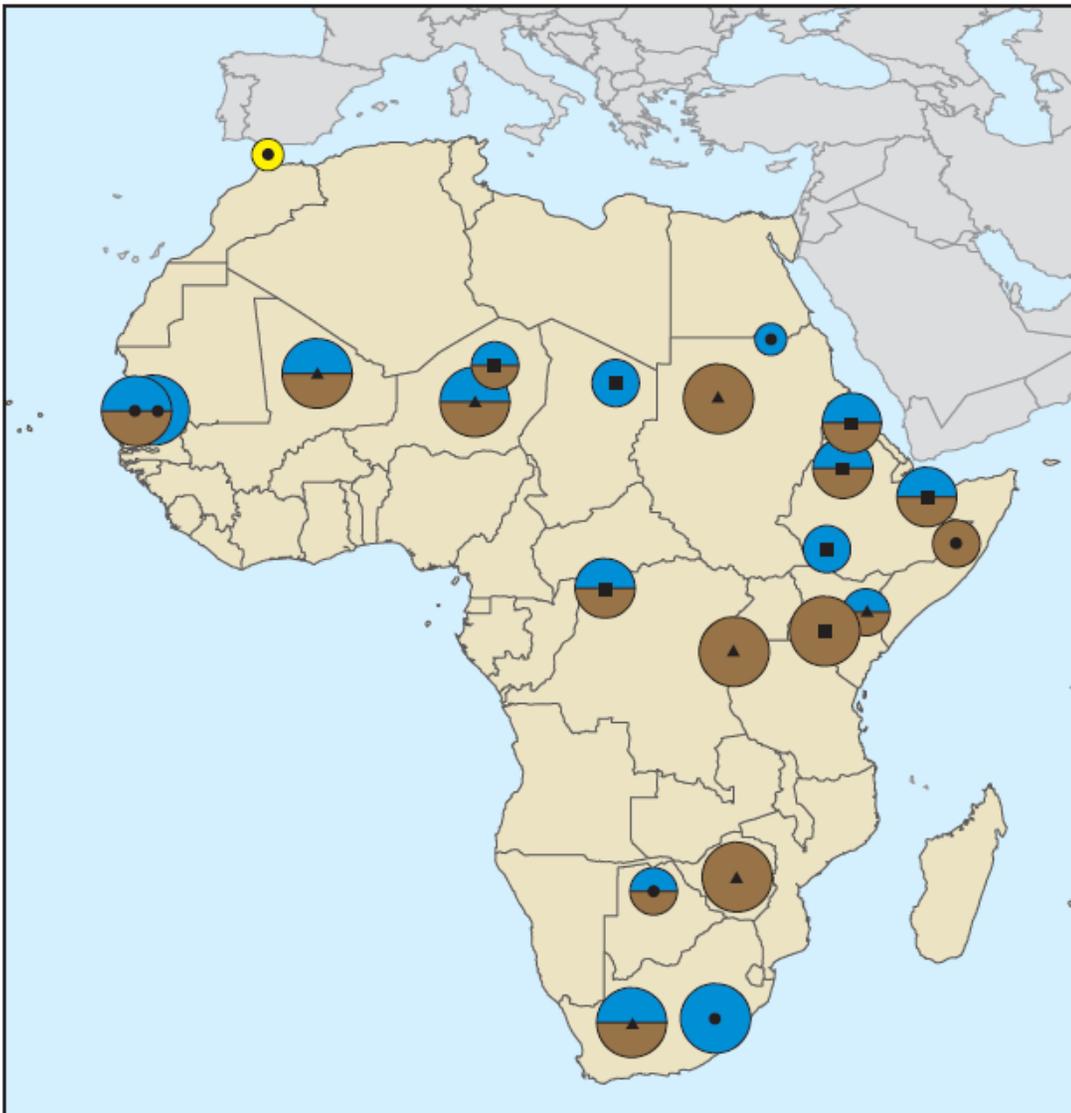
Food production severely threatened by global warming in lower latitudes, particularly through loss of cereal harvests and insufficient adaptive capacities (IPCC 2007b).

Temperature rise of >4 °C with major negative impacts on global agriculture.

Share of agriculture in GDP and per capita income (2004)



Environmental conflicts in Africa (1980–2005)



Conflict intensity

- Diplomatic crisis
- Protests (partly violent)
- Use of violence (national scope)
- Systematic/collective violence

Conflict cause

- Water
- Land/soil
- Fish
- Biodiversity

Conflict scope

- Local
- ▲ National
- International

Warming increases the risk of civil war in Africa

Burke et al (2009): First comprehensive examination of potential impact of global climate change on armed conflict in sub-Saharan Africa.

➤ Strong historical linkages between civil war and temperature in Africa: warmer years leading to significant increases in likelihood of war.

➤ Historical data combined with climate model projections of future temperature trends: 54% increase in armed conflict incidence by 2030, or additional 393,000 battle deaths if future wars are as deadly as recent wars.

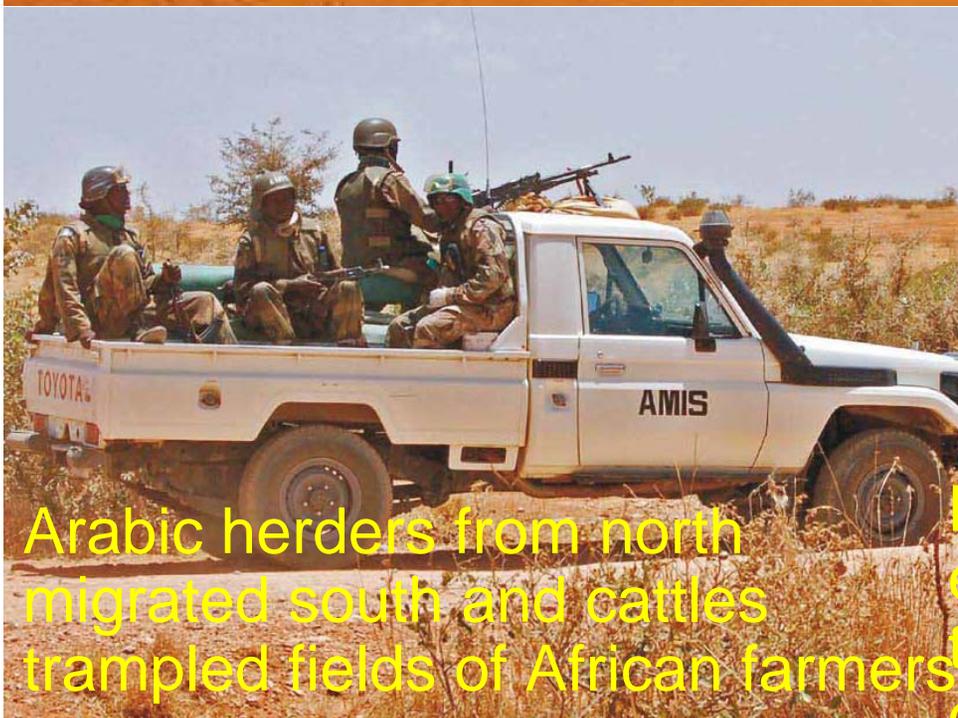
→ Urgent need to reform African governments' and foreign aid donors' policies to deal with rising temperatures.

Source: Marshall B. Burke, Edward Miguel, Shanker Satyanath, John A. Dykema, and David B. Lobell, Warming increases the risk of civil war in Africa, PNAS December 8, 2009 vol. 106 no. 49, 20670–20674.

Farmer-herder land use conflicts in Africa: the case of Darfur Sudan

Boundary semi-desert to desert moved southward by 50 to 200 km since 1930s. Significant drop in food production (20%)

Drought & desertification in Sahara increased migration of nomadic groups into more fertile areas of Darfur.



Arabic herders from north migrated south and cattles trampled fields of African farmers.



Darfur is considered a "tragic example of the social breakdown that can result from ecological collapse" (LINEP 2007)

Mediterranean

Rising waters, heat waves, and forest fires could add increasing stress, leading to a general northward shift in summer tourism, agriculture, and ecosystems.

European countries in Mediterranean face pressures from African immigrants.

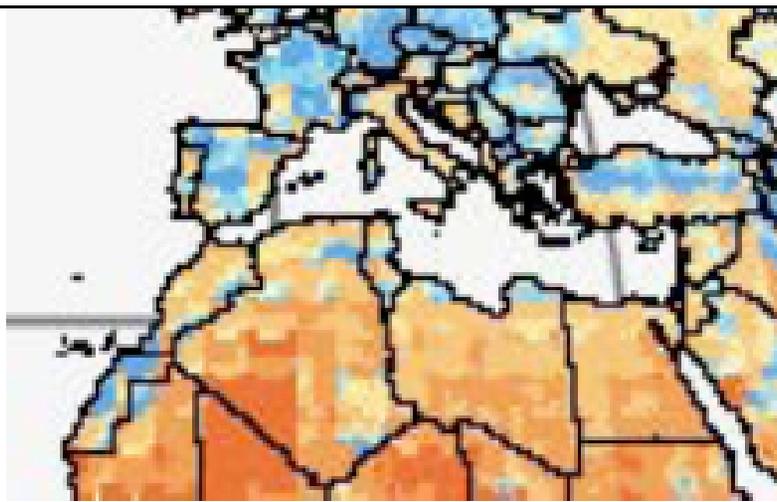
Competition for resources, incl. land and water, is increasing in Canary Islands, south of Italy, Spain, Greece, and Turkey.

Climate change may further endanger these resources and threaten tourism, the main economic driver.

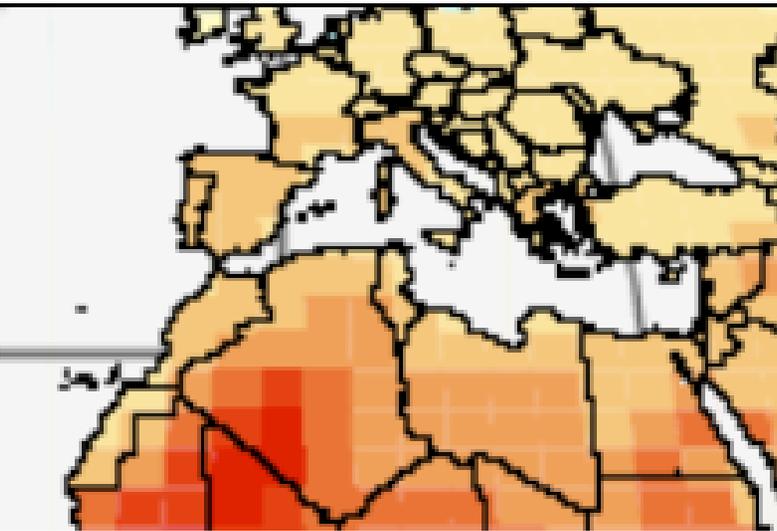
Temperature rise of 2C might decrease summer water availability by 20-30%

Rise of 4C would decrease availability by 40-50%.

Difficult to sustain living standards and development opportunities.

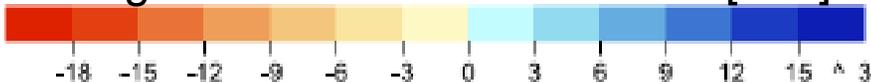


Difference 2040/2069-1975/2004

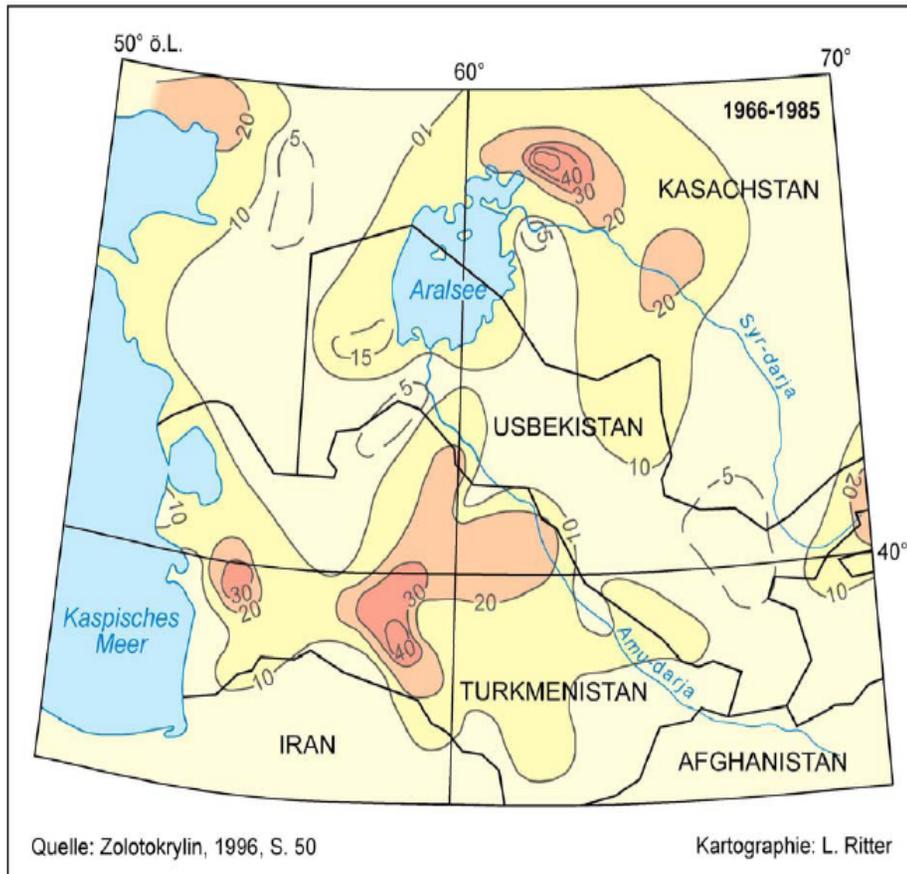


Difference 2070/2099 -2040/2069

Change of climatic water balance [mm]



Central Asia



Sand and dust storms in the Aral Sea area in days per year (1966-1985)

Glacial melt water from mountain ranges:

➤ Irrigation of more than 3/4 of farmland in Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan uses up to 90% of water.

➤ Hydroelectric power supplies most of the region's electricity.

IPCC projects sharp temperature rise:

→ By 2050 about 20% of some glaciers may disappear, putting hydro-electric power infrastructure and agriculture at risk

Weak states unable to cope with changes:

➤ Largely closed economic markets

➤ Extreme social disparities

➤ Weak state structures

➤ Corruption

➤ Past struggles over land and water

➤ Ethnic disputes

➤ Separatist movements

➤ Religious-fundamentalist groups

Weather-related disasters

Figure 1. Weather-Related Disasters, Five-Year Averages, 1983–2007

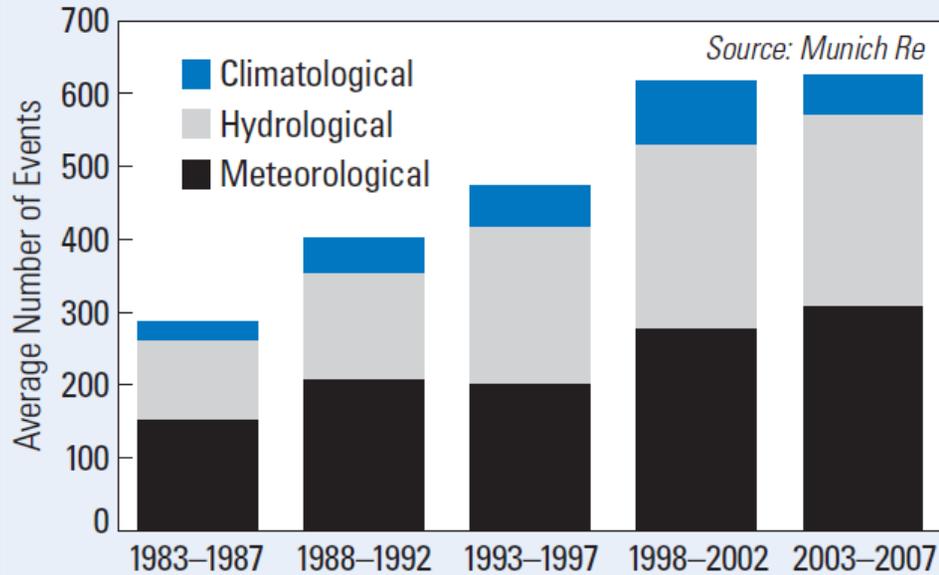


Figure 2. Economic and Insured Losses from Weather-Related Disasters, 1980–2007

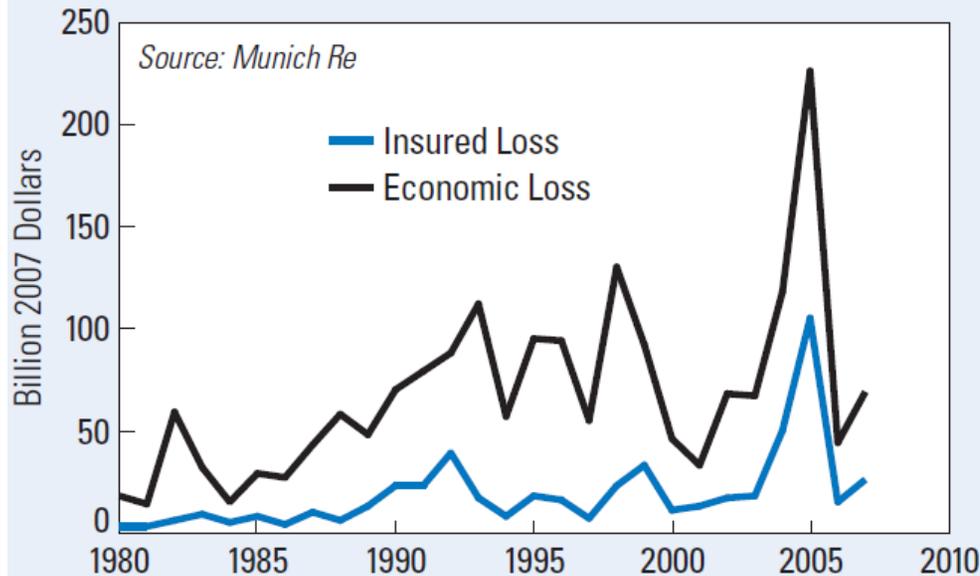
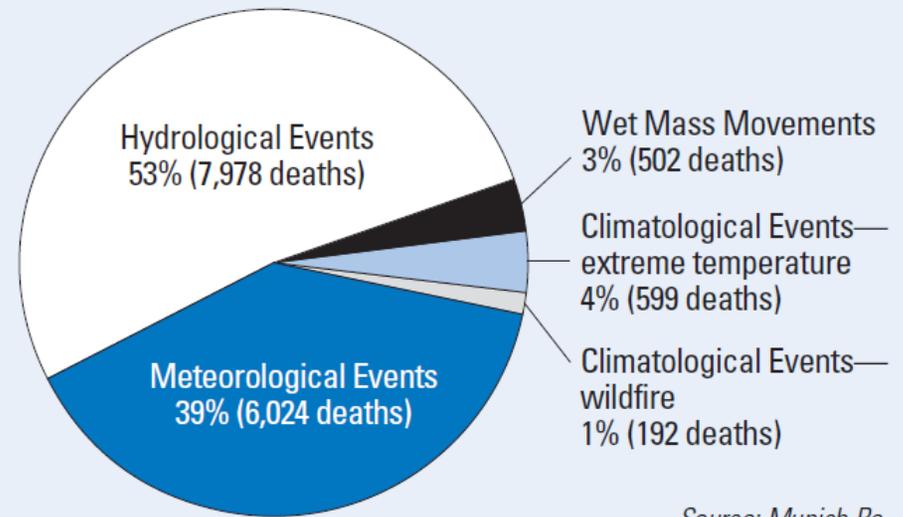
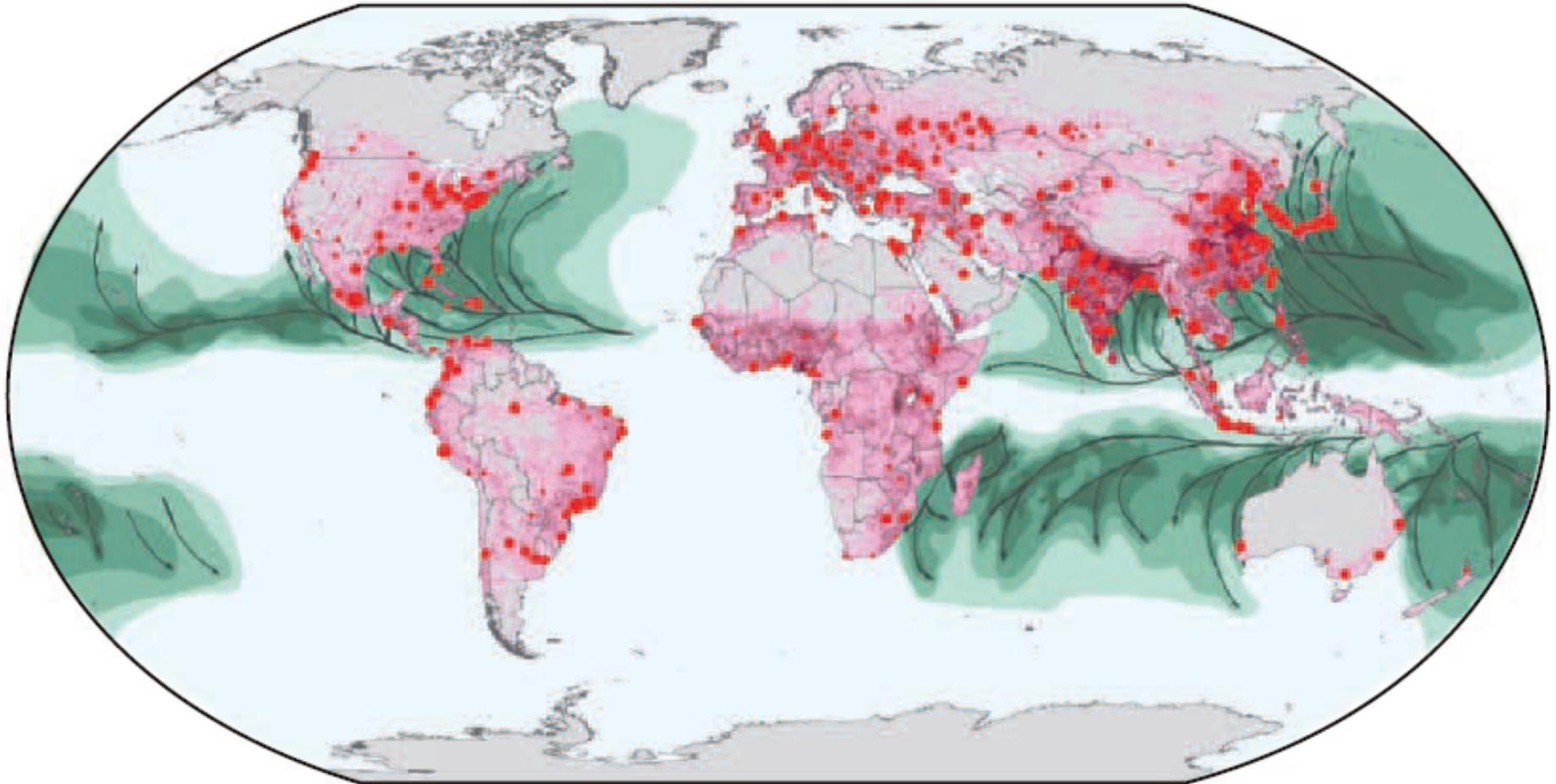


Figure 3. Deaths from Weather-Related Disasters, 2007



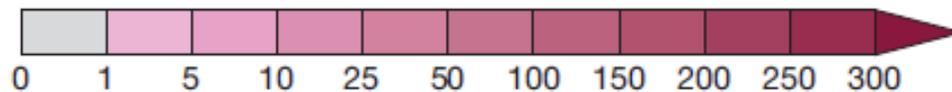
Tropical cyclone threat to urban agglomerations



Tropical cyclones:
rising intensity and frequency



Population density, 2004



Inhabitants [millions]



Source: WBGU 2007

Climate change and disaster risk

Climate change increases frequency of extreme weather events:

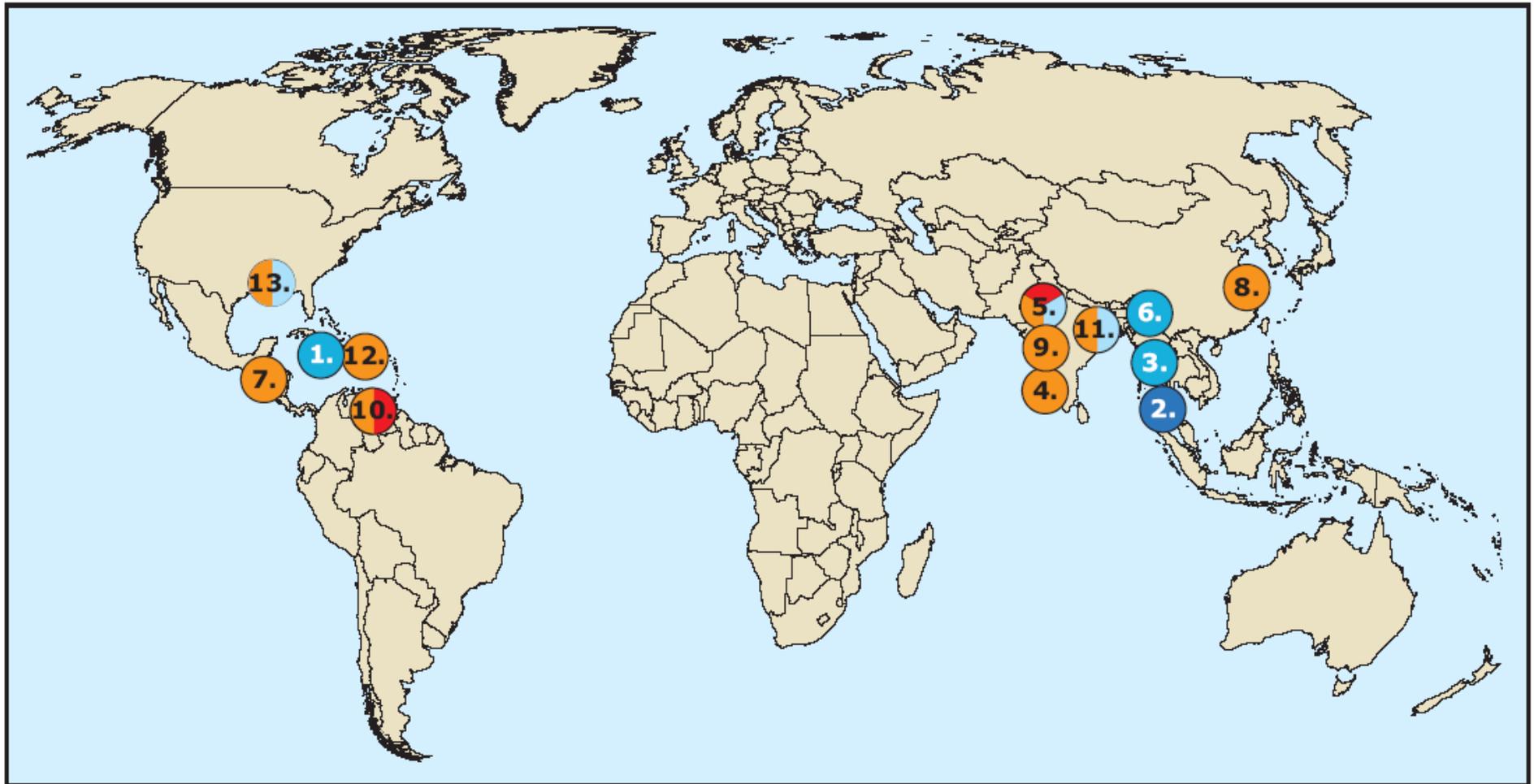
→ Risk of damage to property and infrastructure also rises.

→ Insurance companies will need to significantly increase the amount of capital they hold to be able to provide insurance cover at a level comparable to today.

→ Given an increase in storm intensity of 6 per cent as predicted by many climate models for a rise in temperature of around 3 °C, the capital requirement of insurers for hurricanes in the USA would have to increase by more than 90 per cent (Association of British Insurers, cited in Stern, 2006).

→ It is foreseeable that the insurance market will grow, whereby premiums for insuring against climate-related losses are likely to rise and certain risks will increasingly be classed as no longer insurable (IPCC, 2007b).

Storm and flood disasters with destabilizing and conflict-inducing consequences



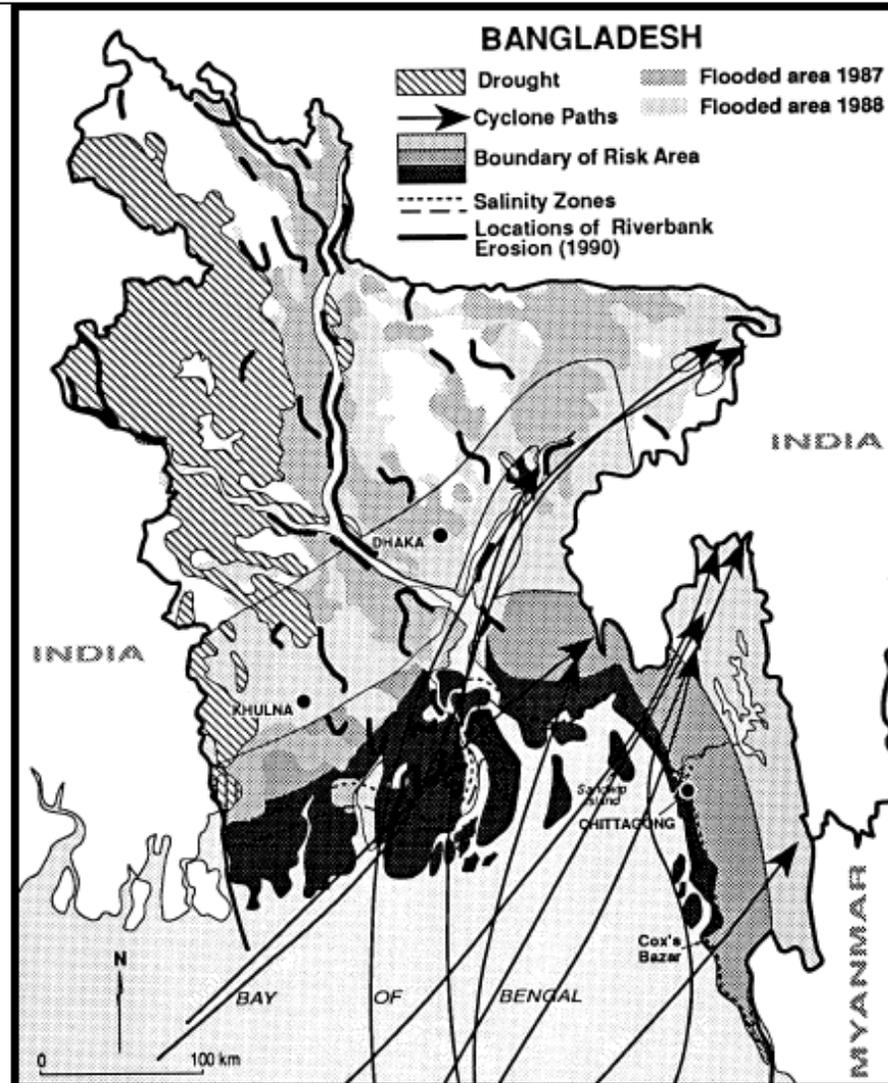
● Government crisis ● Government crisis with regime change ● Government crisis with ensuing war ● Anarchy and looting ● State violence

Carius et al 2006

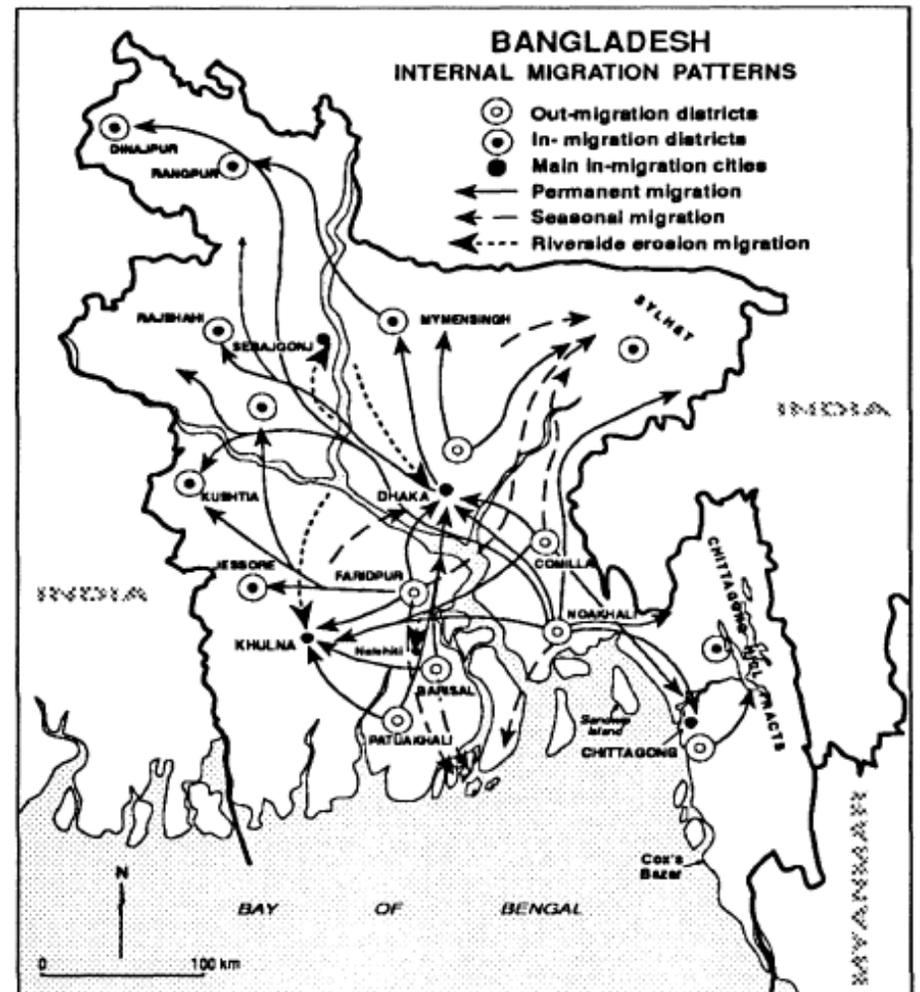
* In these cases, disasters led to an intensification of existing tensions.

Possible climate impacts in Bangladesh

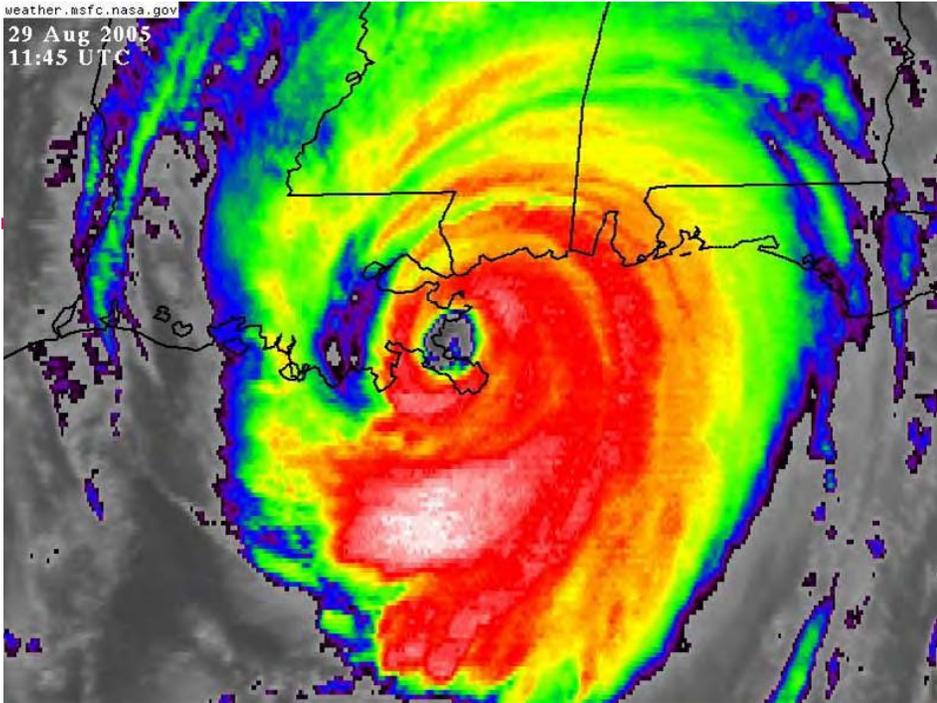
7: Climate-related Natural Events



8: Migration in Bangladesh

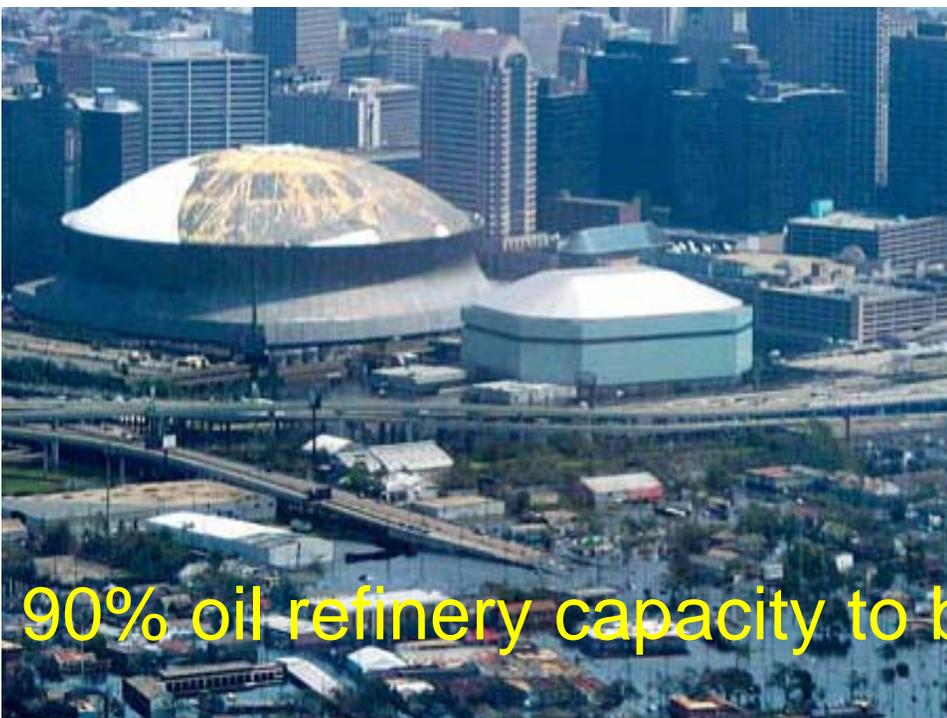


weather.msfc.nasa.gov
29 Aug 2005
11:45 UTC



Hurricane Katrina

About 1,800 deaths;
hundreds of thousands
homeless



90% oil refinery capacity to be shut down.



Refugees after Hurricane Katrina



Environmental migrants and climate refugees

- **Environmental migrants:** people who chose to move voluntarily from their usual place of residence primarily due to environmental concerns or reasons
- **Environmental displaced:** people who are forced to leave their usual place of residence, because their lives, livelihoods and welfare have been placed at serious risk as a result of adverse environmental processes and events (natural and/or triggered by people);
- **Climate refugees:** People who have to leave their habitat, immediately or in the near future, because of sudden or gradual alterations in their natural environment related to at least one of three impacts of climate change:
 - sea-level rise,
 - extreme weather events, and
 - drought and water scarcity.

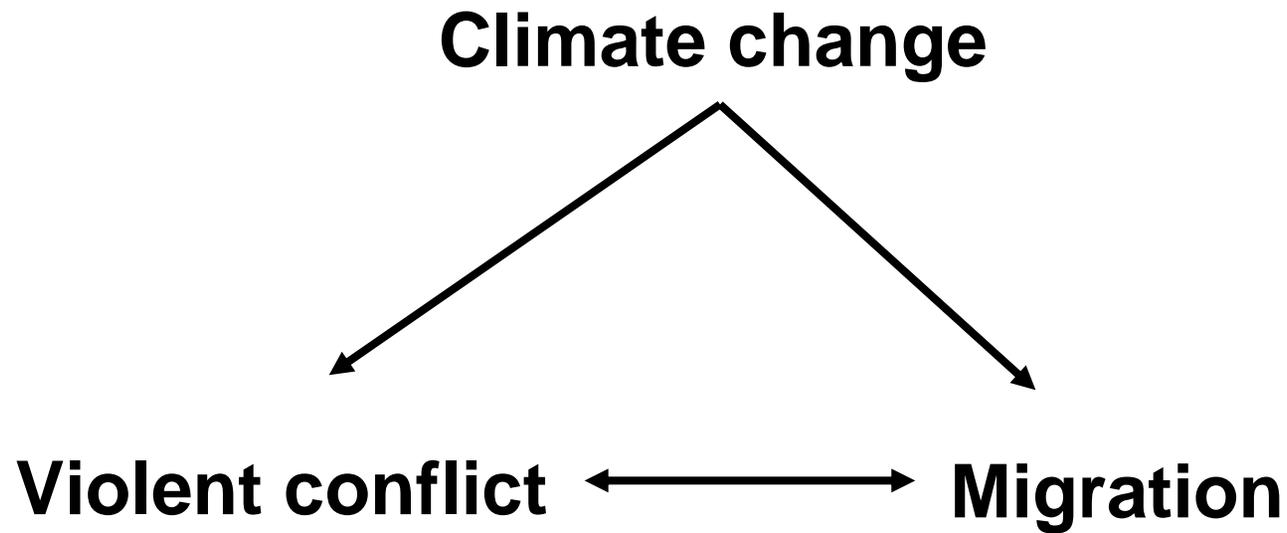
Estimates range from several millions to one billion climate refugees.

Sources: EACH-FOR 2009, Biermann 2009

Factors to migrate

- Area affected
- Intensity of environmental change
- Speed of change
- Who is affected in society?
- Capacity, adaptation and choice
- Difference between source region and target region
- Direct and indirect links between migration and conflict

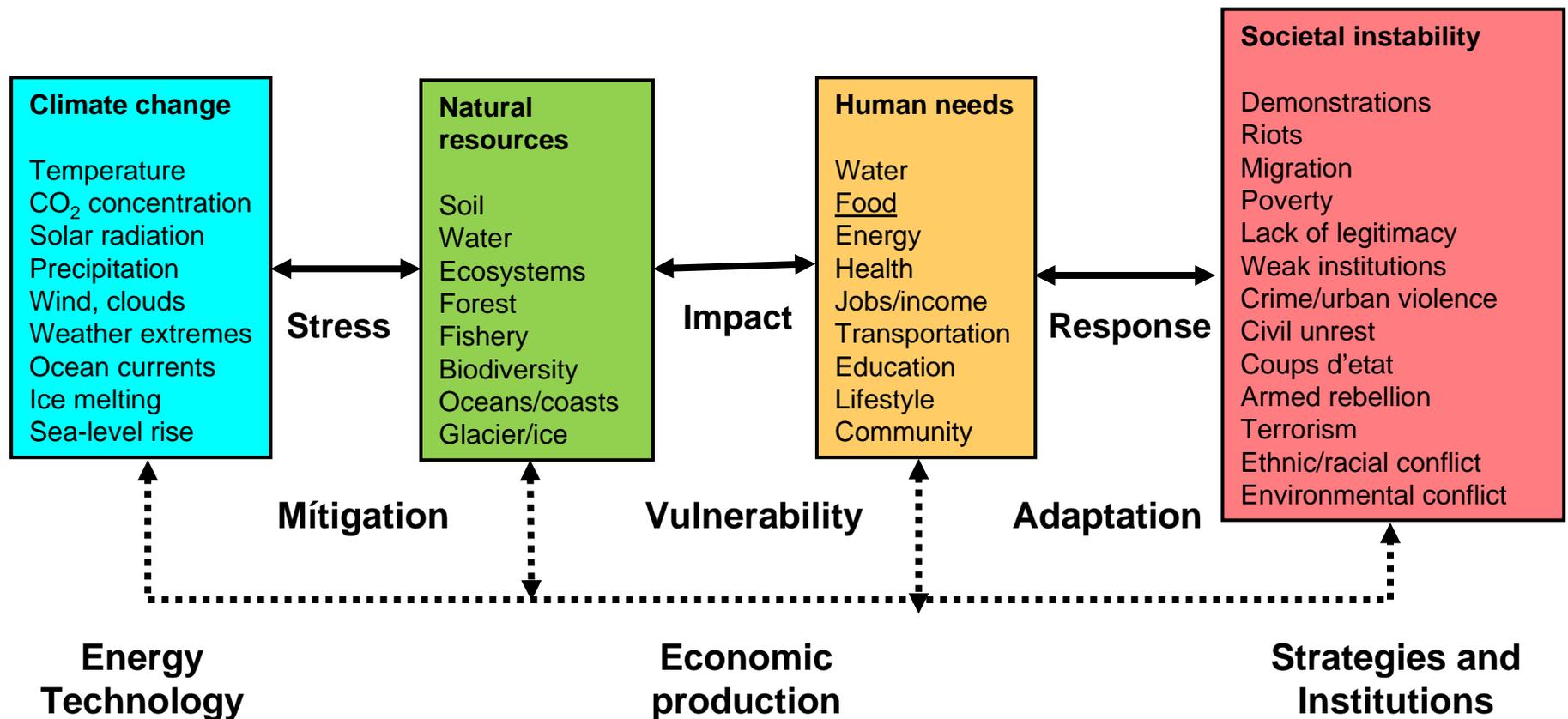
Climate change, conflict and migration



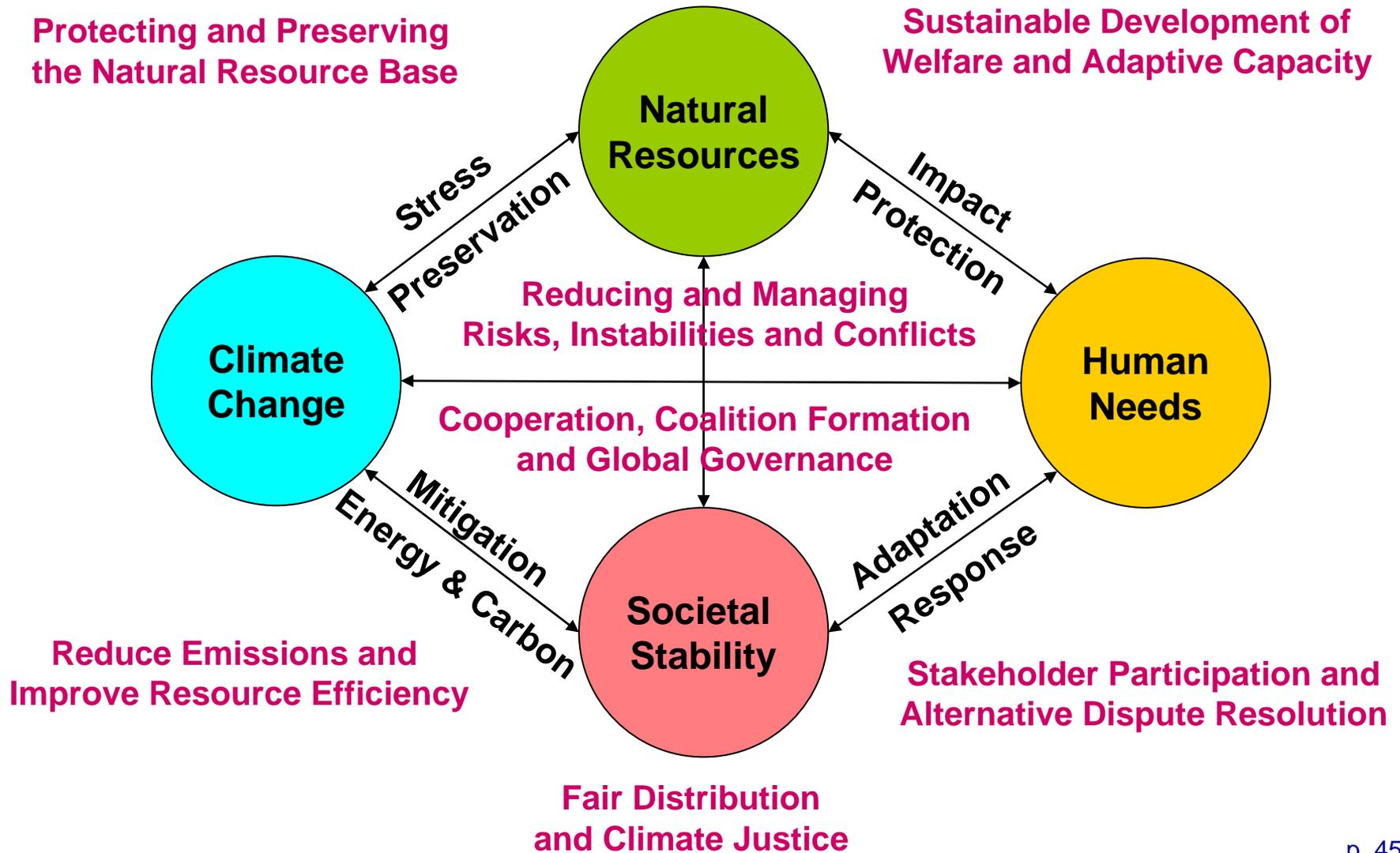
Lessons on the climate-security link

- Environmental factors do not by themselves cause conflict but are part of a **multicausal complex network** of factors that may increase the risk of conflict. Socio-economic factors and governance decisive.
- Impacts and conflicts related to scarcities and migration are most relevant at the **local level**.
- More likely than large-scale civil and international war is **low-level violence**.
- **Risk factors** are variability, vulnerability and adaptive capacity.
- In some cases environmental degradation leads to **more cooperation**.

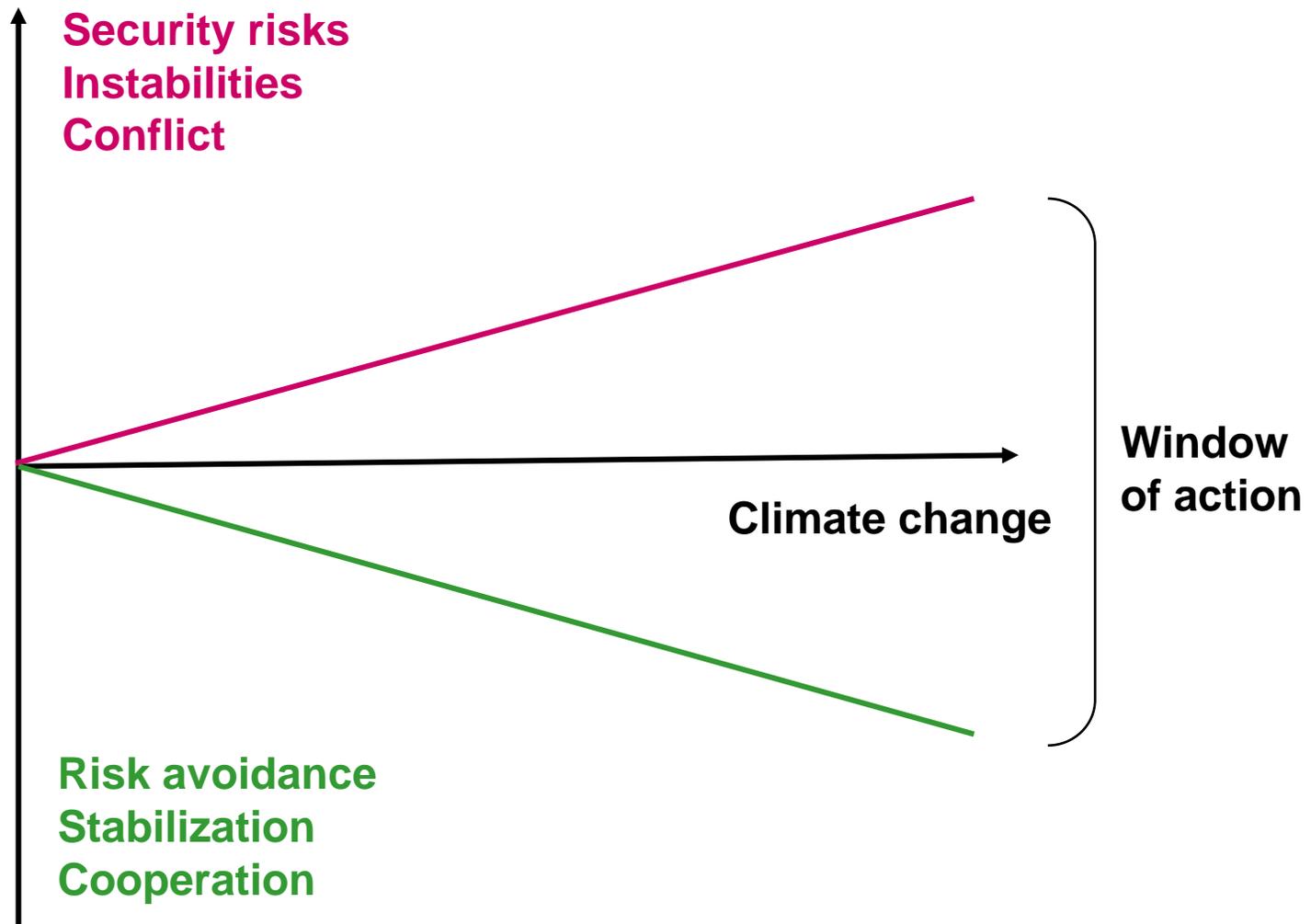
Interaction between climate change, natural resources, human needs and societal stability



Integrated strategies for preventing climate risks and conflicts



How will human beings and societies respond?

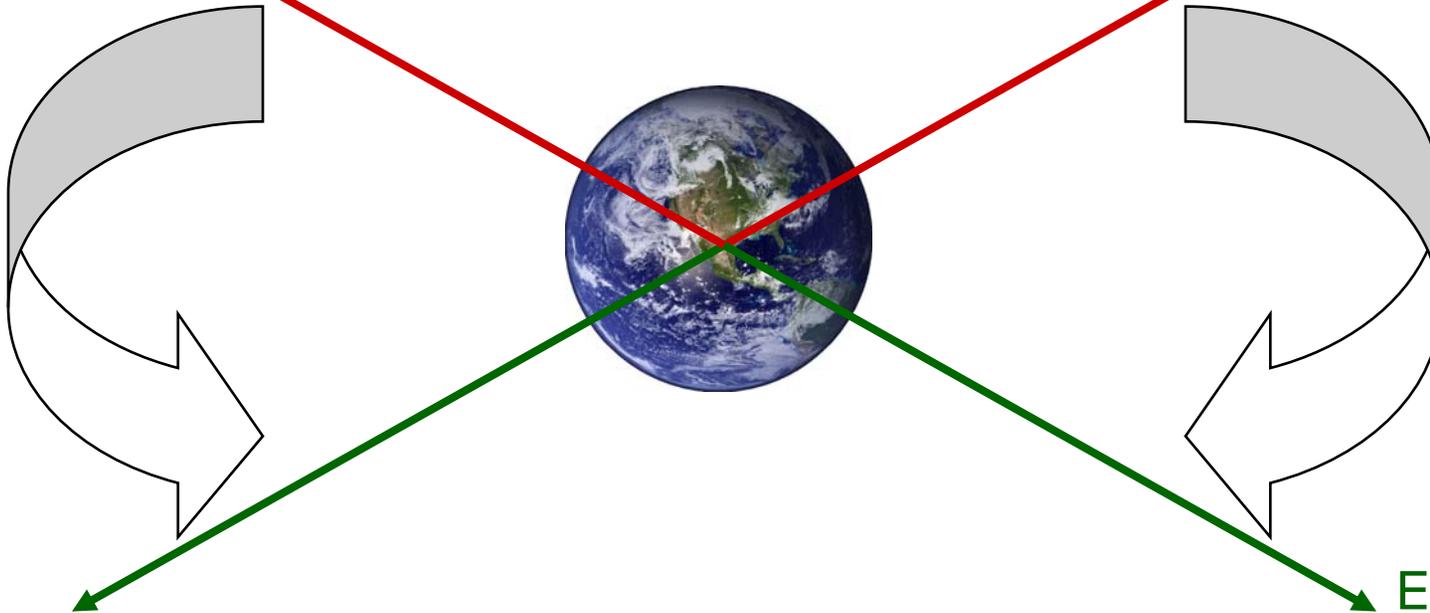


World at the crossroads

Instability and War ↔ **Environmental Destruction**

Conflict

Emission
increase



Cooperation

Emission
reduction

Peace and Security ↔ **Sustainable Development**