Conflicts and Instabilities in Climate-Society Interaction

Universität Hamburg

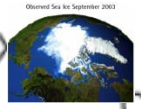
KlimaCampus

Jürgen Scheffran

Research Group Climate Change and Security
Institute for Geography, KlimaCampus, University of Hamburg
Email: juergen.scheffran@zmaw.de
Web: www.clisec-hamburg.de

ISA Panel "Peace and Security in the Anthropocene"
International Studies Association Convention,
Montreal, March 16, 2011

Global distribution of climate risks



Loss of Artic sea ice

Glacier retreat

Species loss

Species loss

Methane outburst

Shutdown of thermohaline circulation

Harvest loss

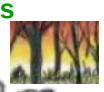
Storms

Sea-level rise

Sea-level rise

Floods

Droughts



Water scarcity

Change in hydrological cycle

Droughts

Tropical Monsoon suppression

Monsoon suppression

Sea-level rise

Diseases

Collapse Amazon forest

Species loss

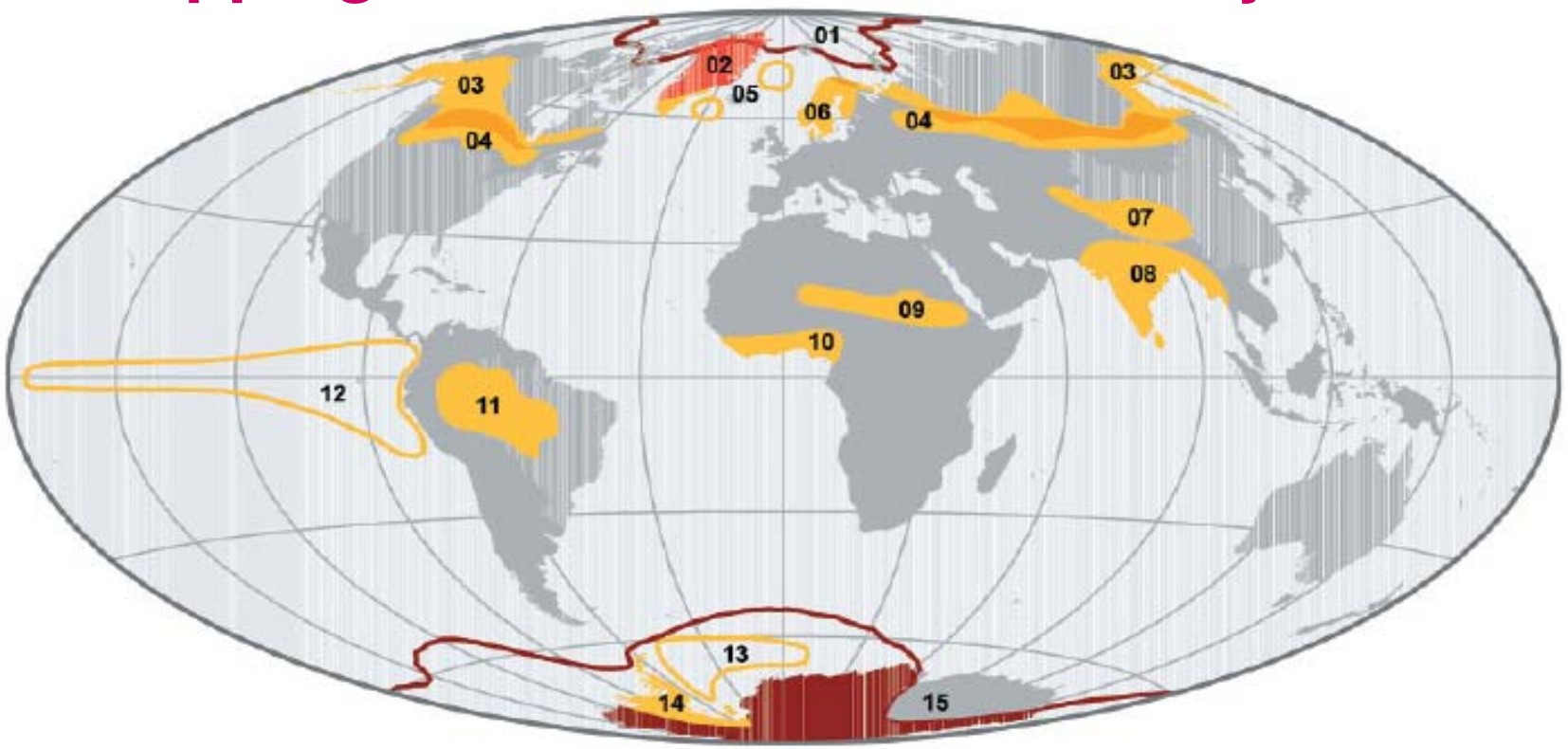
Sea-level rise

Loss of coral reefs

Loss of species & ecosystems

Collapse West Antarctic Ice Sheet

Tipping elements in the climate system



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 Oscillat

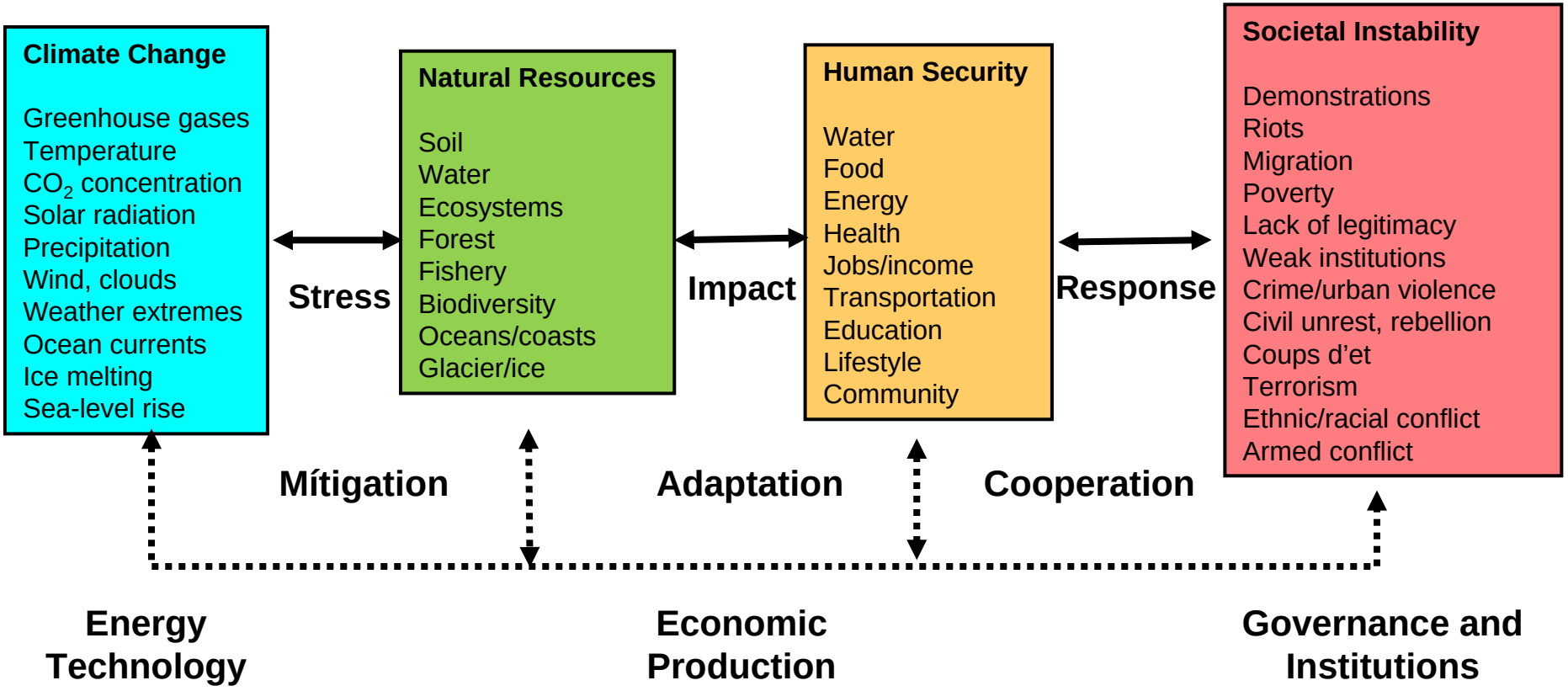
13 Antarctic Deep Water Formation Nutrients Upwelling

14 Westantarctic Ice Sheet

15 Antarctic Ozone Hole

Source: Lenton et al 2008

Framework of climate-society interaction



Stability and instability

General sense of stability: “minor disturbances will not be magnified into a major disturbance, but on the contrary, dampened so as to have only a small and disap-pearing impact” (Ter Borg 1987: 50).

→Change between **qualitatively different system conditions:** from peace to war, from conflict to cooperation, from environmental destruction to sustainability

Ecosystem and economic stability: tolerable windows for admissible speed and magnitude of climate change.

→Adaptive capacities prevent break down against disruption.

Crisis stability: reduce the motivation to use violence and pre-emptive actions, prevent threats to the survival of people.

→ Strengthen mutually beneficial cooperation (win-win solutions), e.g. by resource sharing and joint risk management

Human, societal and political stability: Societies require rules, regulations and institutions that maintain social order and make cooperation beneficial, effective and predictable.

Personal instability ← → societal instability

State fragility, instability and conflict

Failing states: cannot guarantee the core functions of government

- Law and public order
- Welfare
- Basic public services (e.g. infrastructure, health and education)
- Participation
- Monopoly on the use of force

Climate change

- may undercut the ability of governments to satisfy the needs of citizens and to provide opportunities for wealth and prosperity,
- could add to other problems, such as growing populations, inadequate freshwater supplies, strained agricultural resour-ces, poor health services, economic decline and weak political institutions.

→ Marginal impact of climate change could undermine problem-solving capacity of societies in climate hot spots, contributing to their collapse.

→ Instability could spread to neighbour states, e.g. through migration, ethnic links, resource flows, black markets or arms exports.

Complexity and stability

Increasing complexity → more potential instability?

Why do complex systems exist?: biological organisms, ecosystems, societies, networks, technical systems, ...

→Evolutionary selection: Unstable systems disappear, stable systems remain

→Adaptation and learning improves stability

→Evolution towards increasing complexity and stability by natural selection

→ Intentional action, control and innovation in social evolution

Networks, cascades and path dependencies

Social network analysis: structural analysis of social interaction, diffusion and conflict.

Path dependency: social actors locked in certain pathways of action that are self-enforcing and hard to change individually.

Tipping points involve "that events and phenomena are contagious, that little causes can have big effects, and that changes can happen in a non-linear way but dramatically at a moment when the system switches" (Urry 2002:p.8)

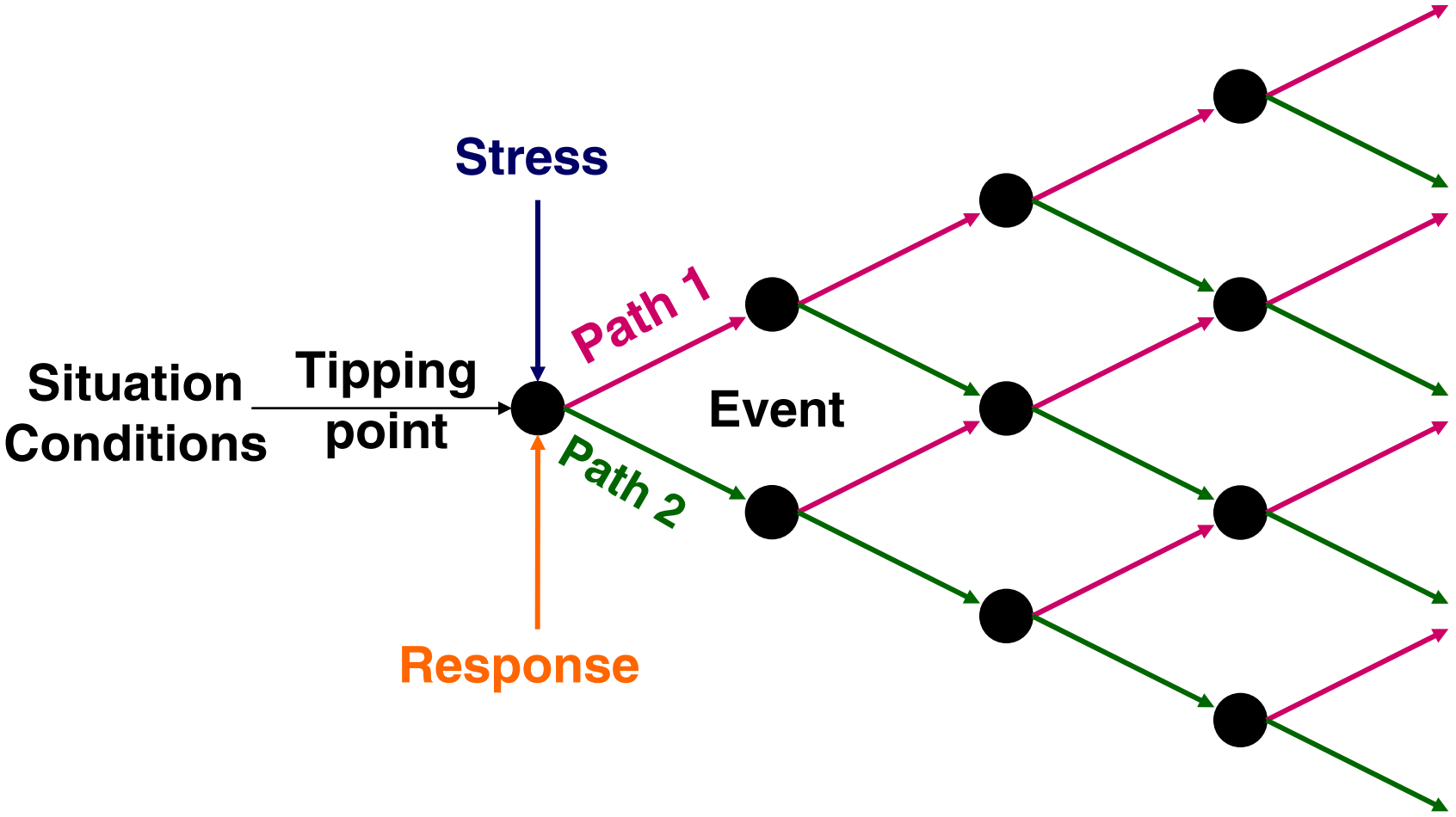
Chaos: Seemingly "minor" events could provoke major qualitative changes of the system.

Informational cascades: "optimal for an individual, having observed the actions of those ahead of him, to follow the behaviour of the preceding individual without regard to his own information." (Bikhchandani et al. 1992)

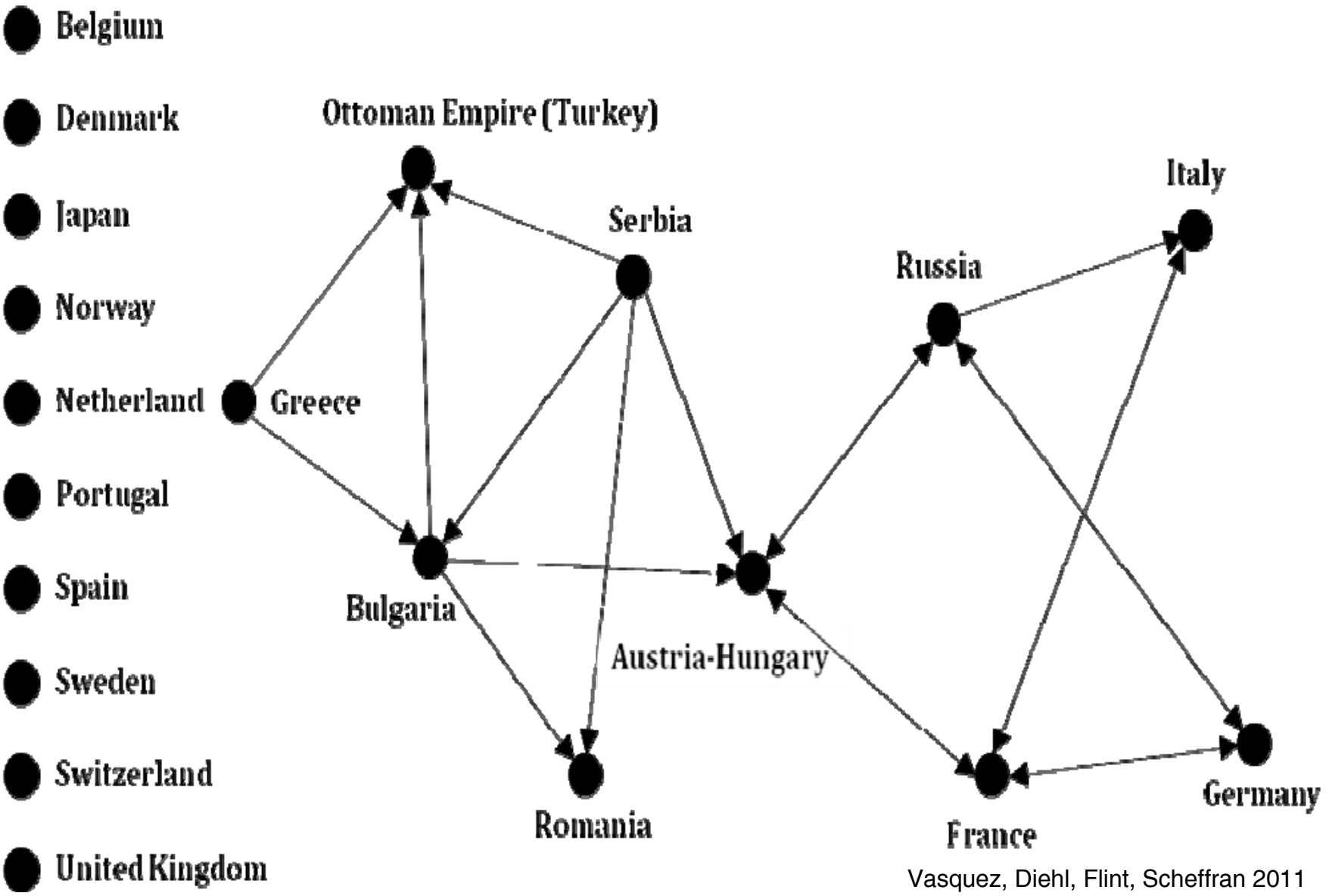
Cascading sequence of events: action taken by one actor provokes more intense actions by other actors

Self-reinforcing chain reaction: increasing opportunity for cascades that lead to a qualitative system change.

Tipping points, networks, cascades and path dependencies



Targeted alliance structure before World War I



Vasquez, Diehl, Flint, Scheffran 2011

CITY PRICES | London Herald | LATE EDITION

No.45591 SATURDAY 11th NOVEMBER 1989 25p

BERLIN WALL TUMBLES

'Beginning of the End' for Communism

Germany Re-unified

Celebrating East Berliners tear down the Berlin Wall

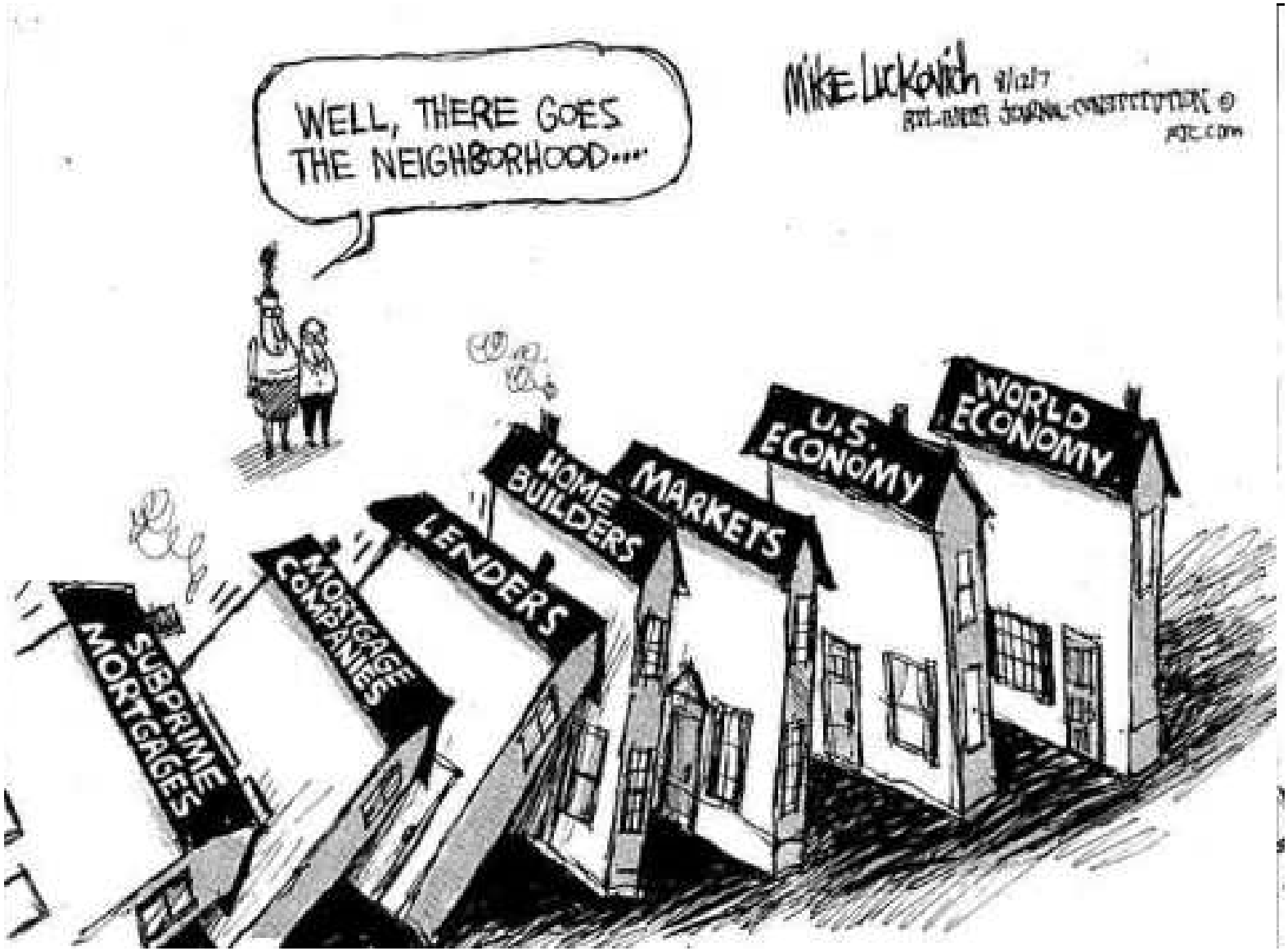
Breaching the Wall

After 'GCSE and 'Levels what about a career at Sea level?

OTHER NEWS

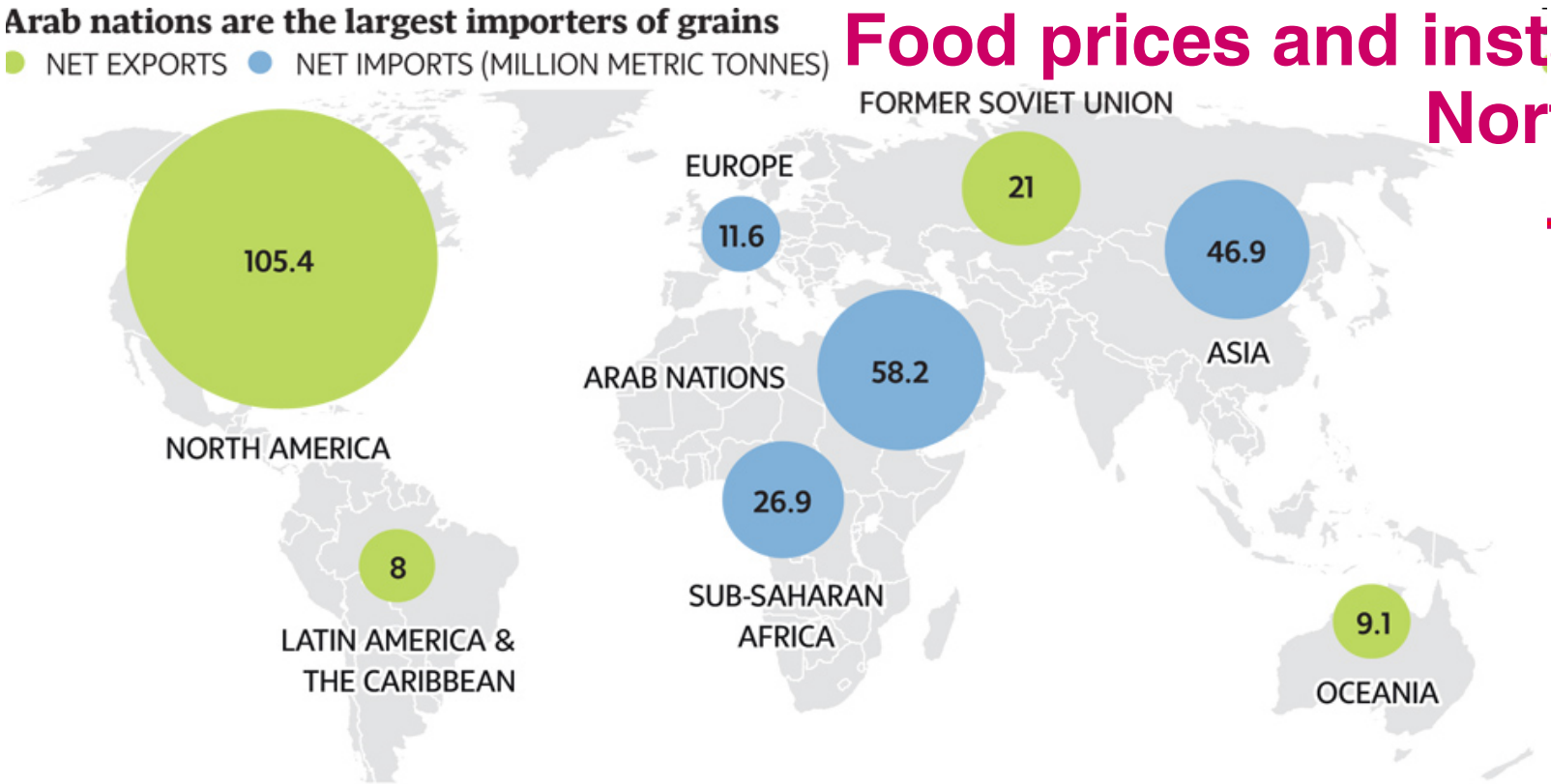
http://www.dailymail.co.uk/news/worldnews/article-1225929/And-Berlin-Wall-comes-tumbling---again.html
http://msnbcmedia1.msn.com/j/MSNBC/Components/Photo/_new/g-cvr-091109-berlin-wall-120p.grid-6x3.jpg

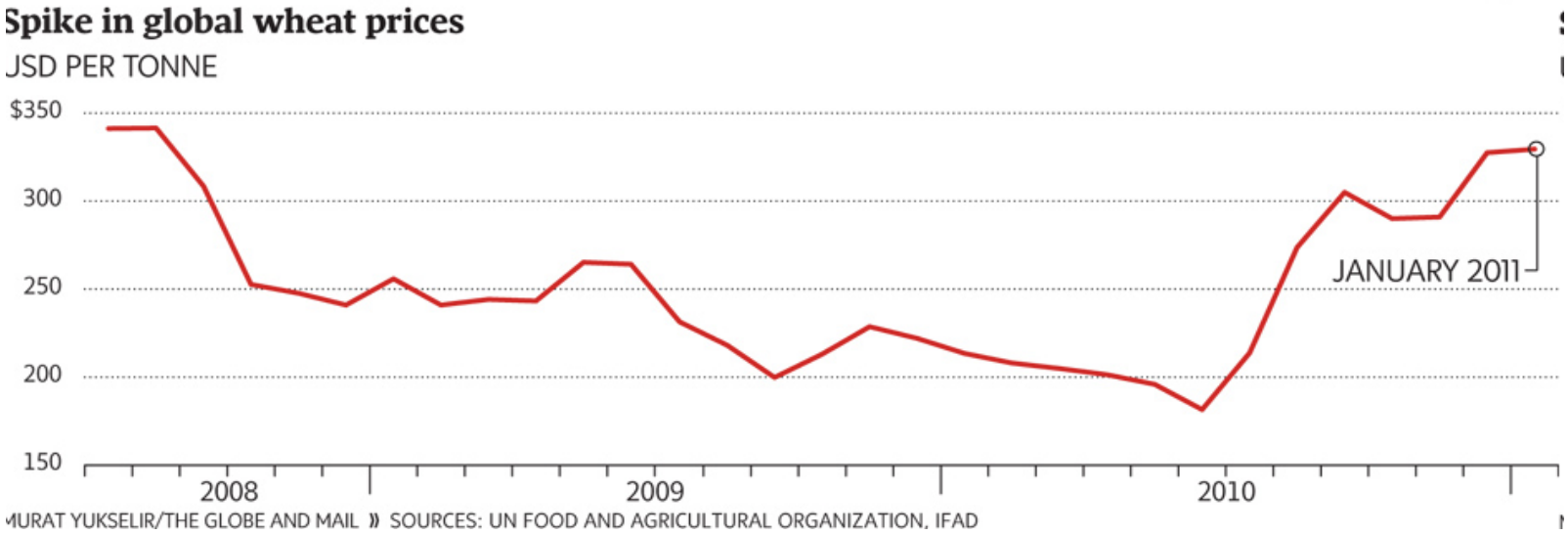
2008 economic crisis



http://www.myfinancetimes.com/2008/10/lehman-brothers-accelerates-cascading.html

Food prices and instability in North Africa



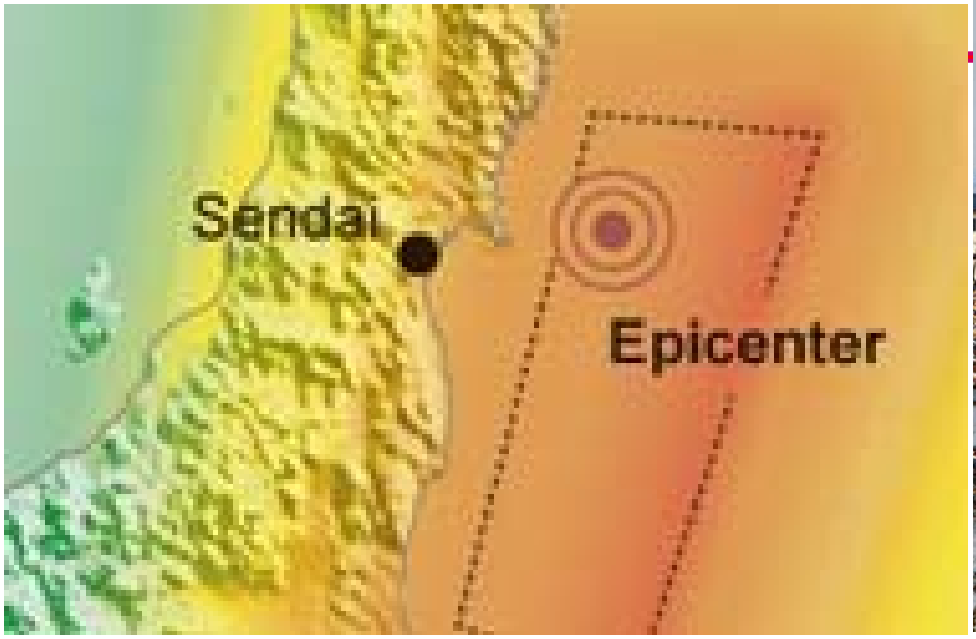


http://www.theglobeandmail.com/news/world/crisis-in-egypt/arab-nations-are-the-largest-importers-of-grains/article1889683/?from=1889680

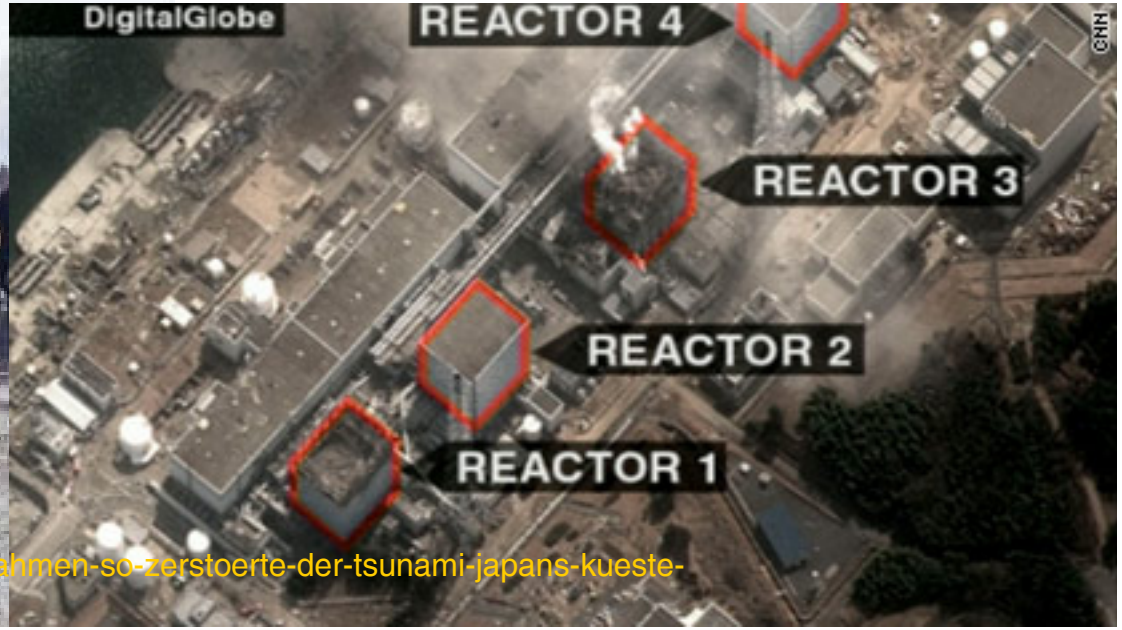
Turmoil in North Africa and Middle East

http://www.swissinfo.ch/eng/multimedia/picture_gallery/Turmoil_in_Egypt.html?cid=29390414

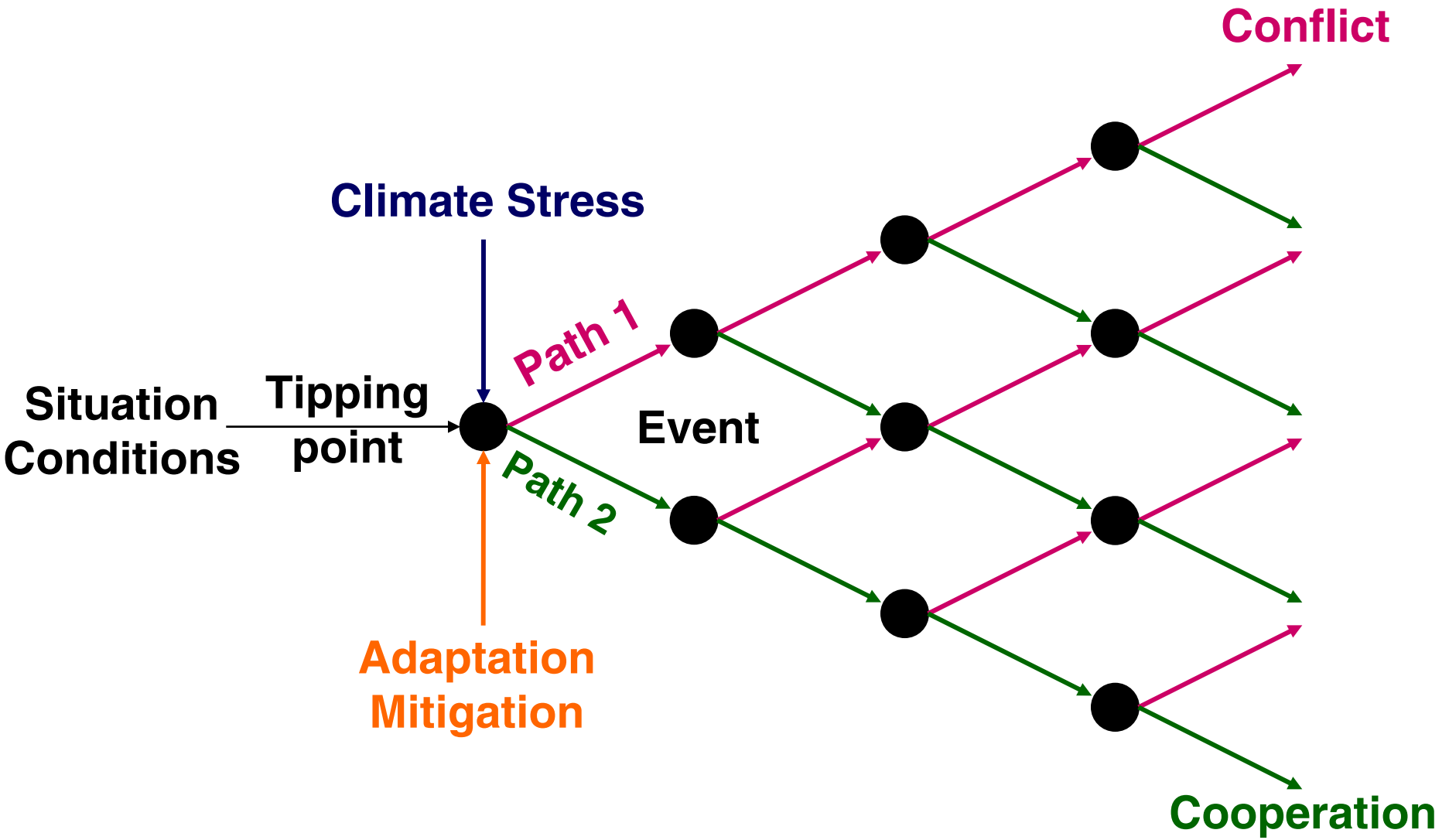
Cascading natural disaster in Japan



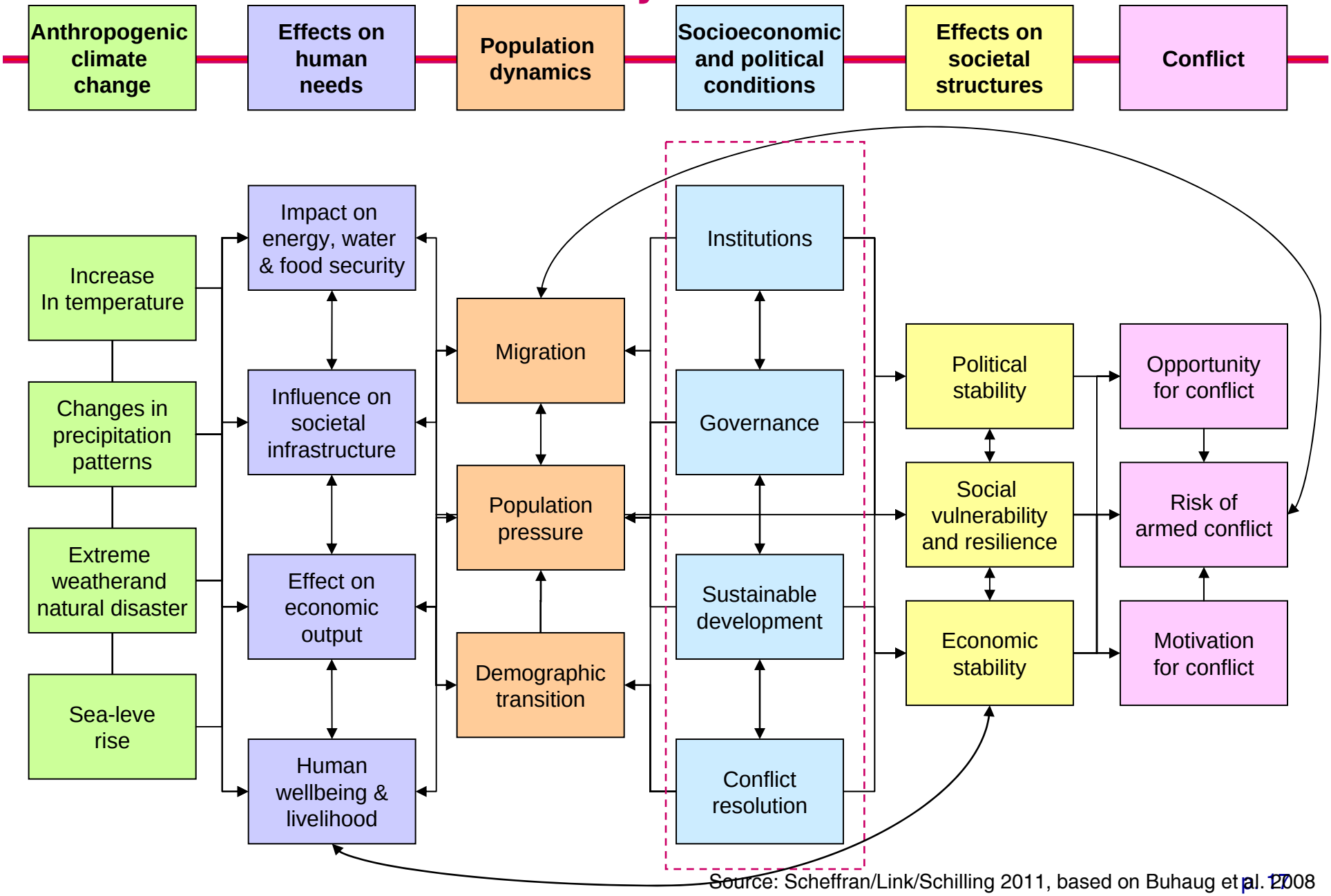
http://www.stern.de/panorama/neue-dramatische-aufnahmen-so-zerstoerte-der-tsunami-japans-kueste-1663024-photoshow-55de250c61712bcf.html



Tipping points, networks, cascades and path dependencies in climate change



Possible pathways between climate change, instability and conflict



Source: Scheffran/Link/Schilling 2011, based on Buhaug et al. 2008

Issues in the environmental conflict debate

1. Environmental destruction and resources scarcity may contribute to violent conflicts but are hard to verify due to indirect effects in multi-causal chains.

2. Potential conflict patterns: resource capture, ecological marginalization, migration

3. The probability of violent conflicts between states over renewable resources has been rather low.

4. Whether a latent conflict over water or food becomes manifest, depends on position differences over the access to resources as well as the power, interests and perceptions between conflict parties.

5. Often the environment may not be the primary cause but a catalyzer or multiplier of existing conflicts, rarely leading to direct violence.

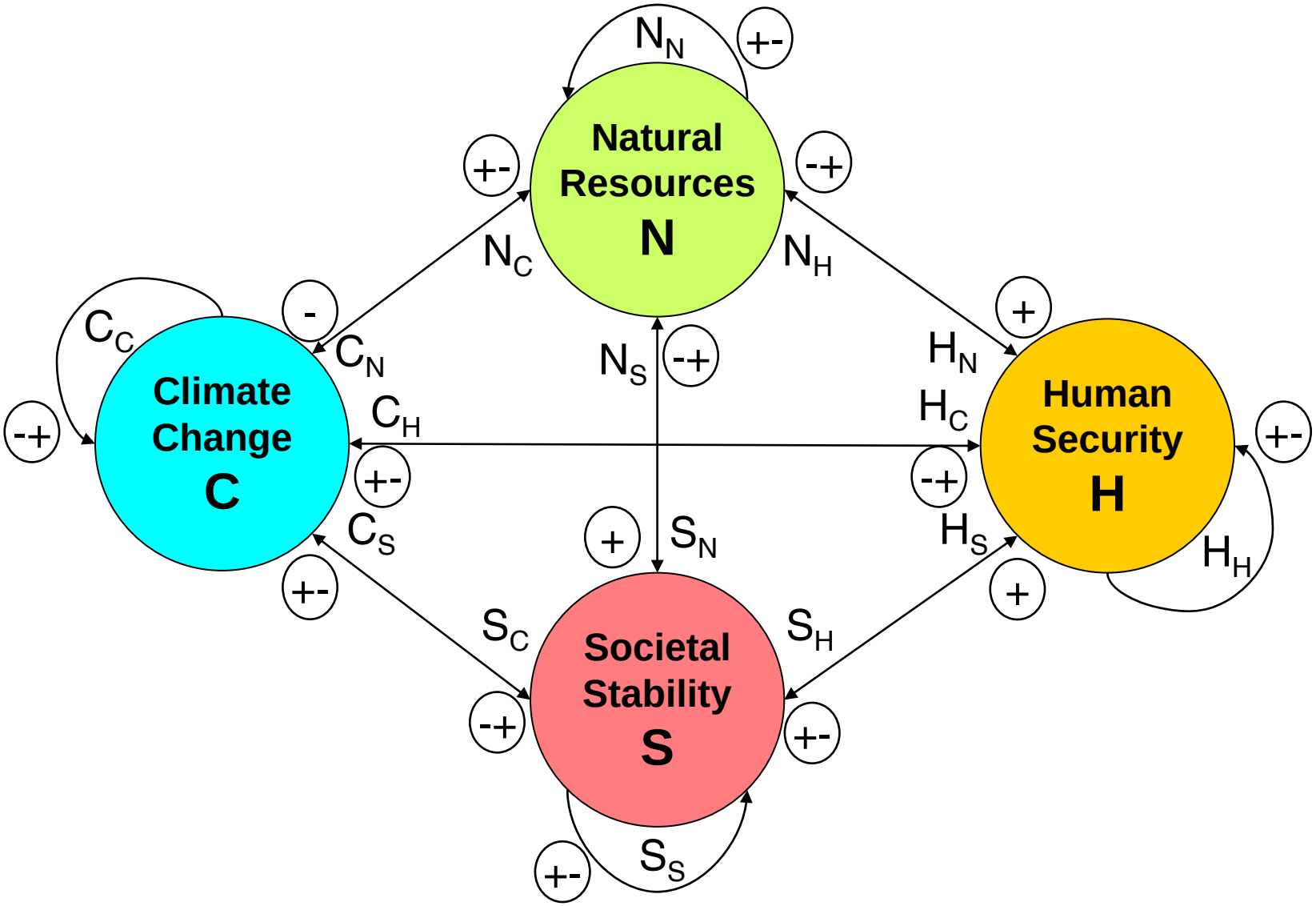
6. Environmental changes can disturb complex ecological balances, economic and social processes rather slowly and in the lon run, undermine human needs, the capacity to act and the political legitimacy of governments.

7. To which degree environmental risks will lead to conflicts depends on the societal conditions which are shaped by the conflict history, group identities, organisation and capacity of conflict parties, governance structures, institutions and conflict regulation mechanisms.

Empirical lessons on the climate-security link

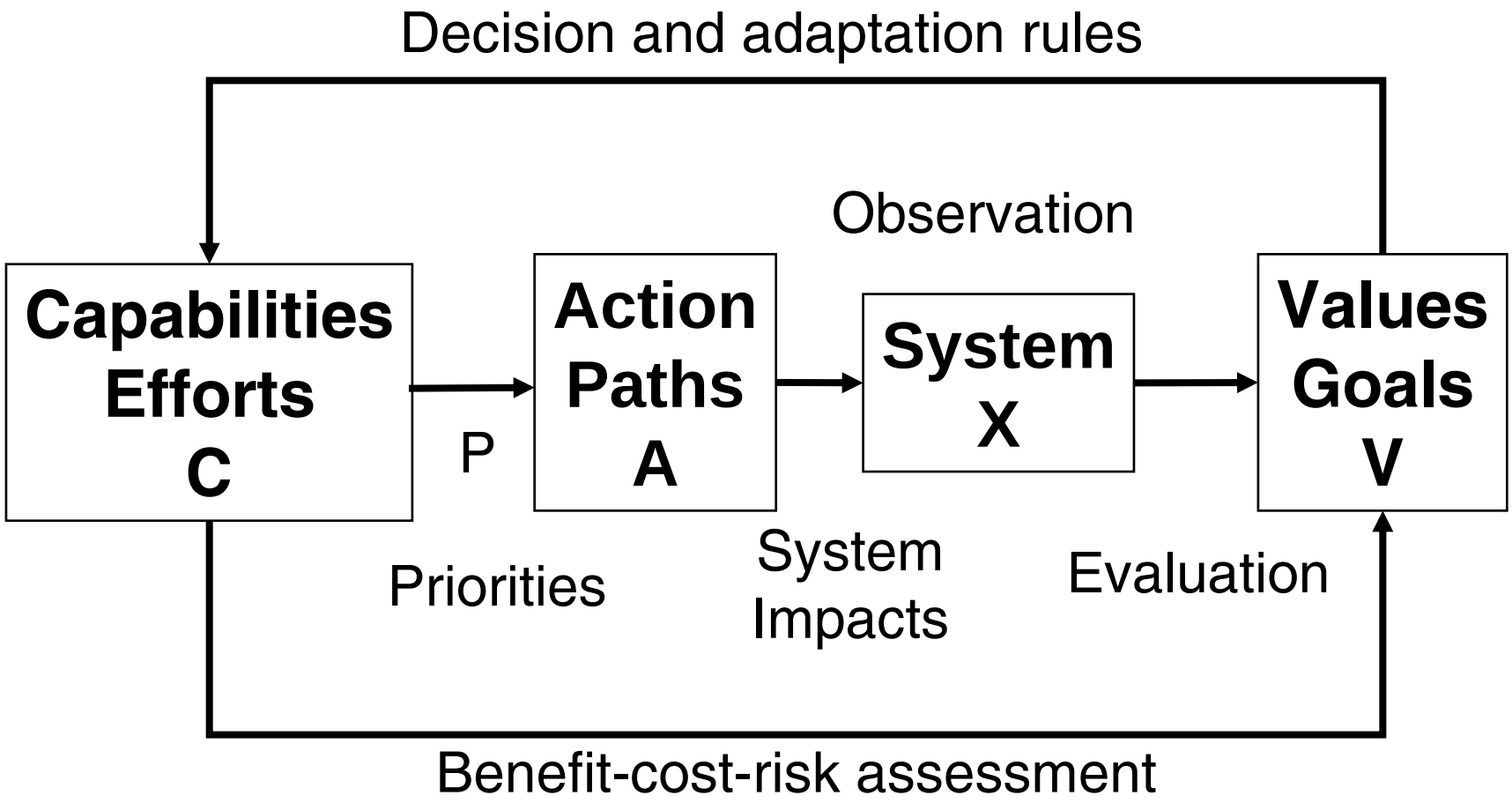
- **Weak empirical evidence** on climate-conflict link over recent decades (Buhaug/Gleditsch/Theisen 2008)
- **Historical studies** found statistical correlations between global temperature and frequency of war, e.g. Little Ice Age (Zhang et al. 2007, Tol/Wagner 2009)
- Projected climate-induced increase in the frequency of **civil war in Africa** until 2030 (Burke et al. 2009) is contested (Buhaug 2010)
- Climate **hot spots** and conflict constellations (WBGU 2008)
- Impacts and conflicts related to scarcity and migration relevant at **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**.

Possible sensitivities in climate-society interaction



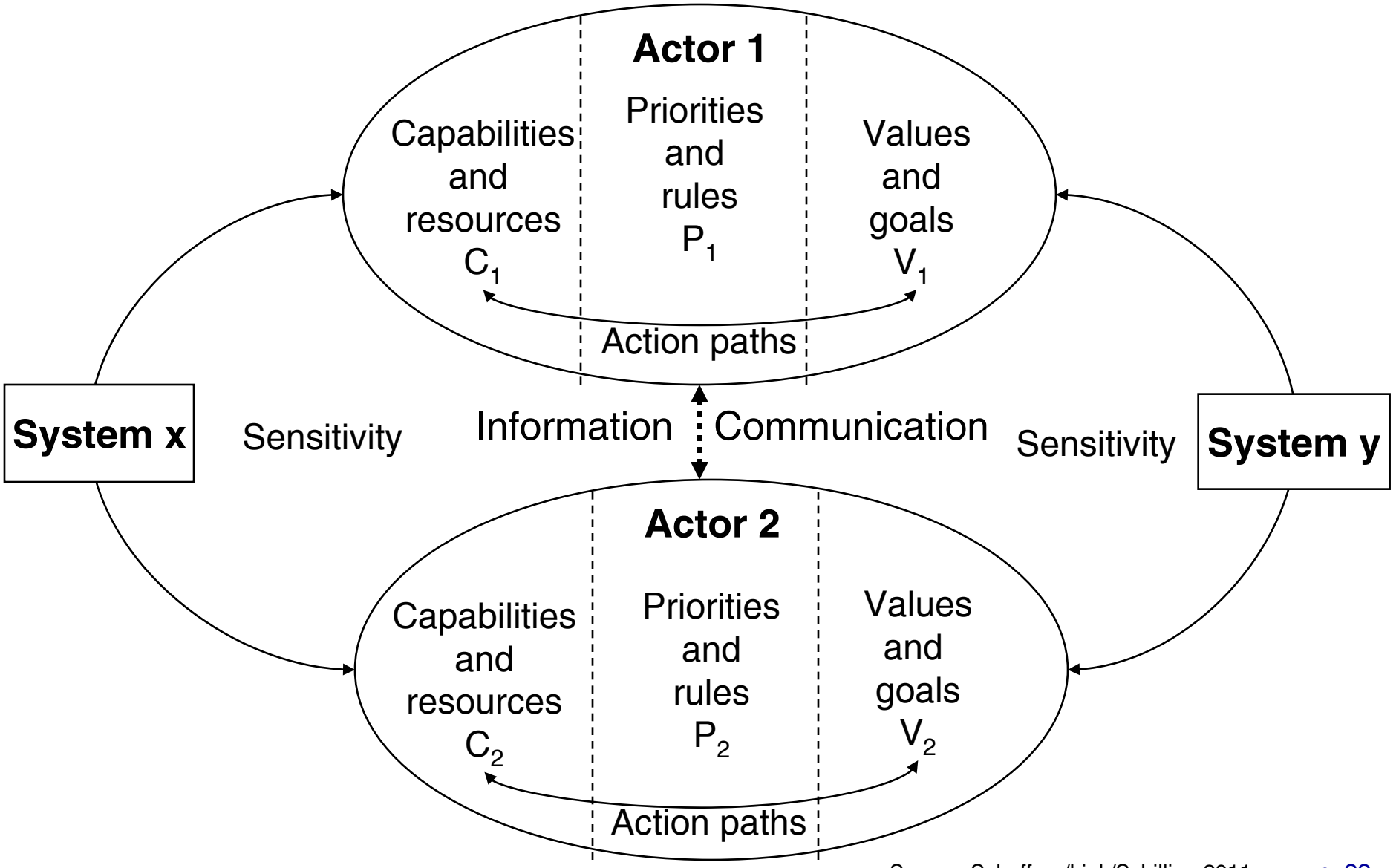
Source: Scheffran/Link/Schilling 2011

Interaction between systems and actors



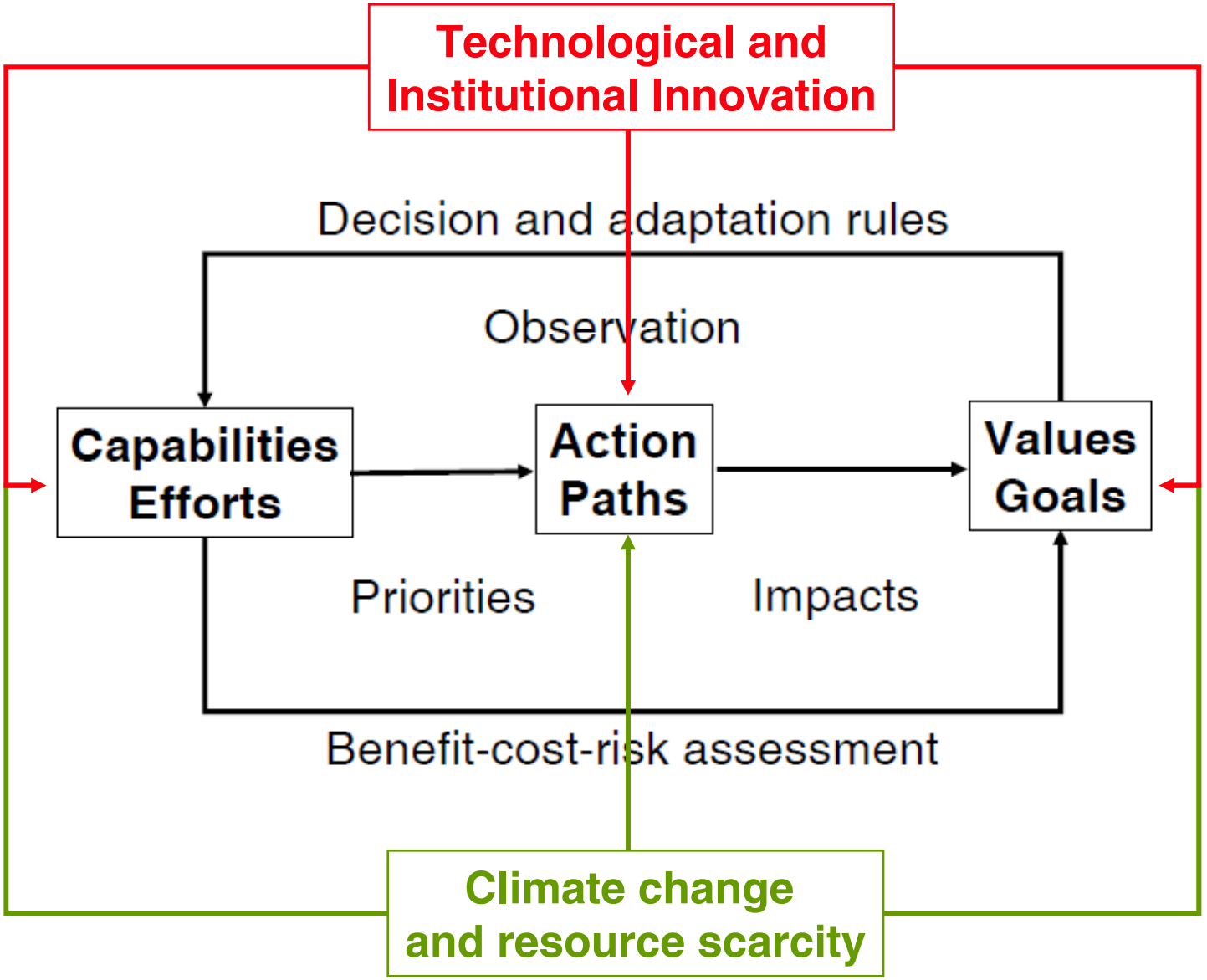
Source: Scheffran/Link/Schilling 2011

Multi-agent interaction



Source: Scheffran/Link/Schilling 2011

The role of adaptation, innovation and resilience



From climate instability to social resilience

Resilient systems will be able to cope with stress and retain its qualitative structure.

→Capacity to withstand shocks and surprises and, if damaged, to rebuild itself.

→Whether resilience can be maintained depends on the strength and size of the change, and the relative capacity of the community to cope with the change.

→In a resilient social environment, the social actors are able to cope with and withstand the disturbances caused by environmental change in a dynamic and flexible way that preserves, rebuilds, or transforms their social order to retain their livelihood.

→Concepts of resilience can strengthen the social capability of people in their creative and collective efforts to handle the problems associated with climate change.

→Resilience strategies include the building of networks, the cultivation of diversity and the maintenance of flexibility.