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Climate Change Adaptation

Background and main concepts

Tor Håkon Jackson Inderberg

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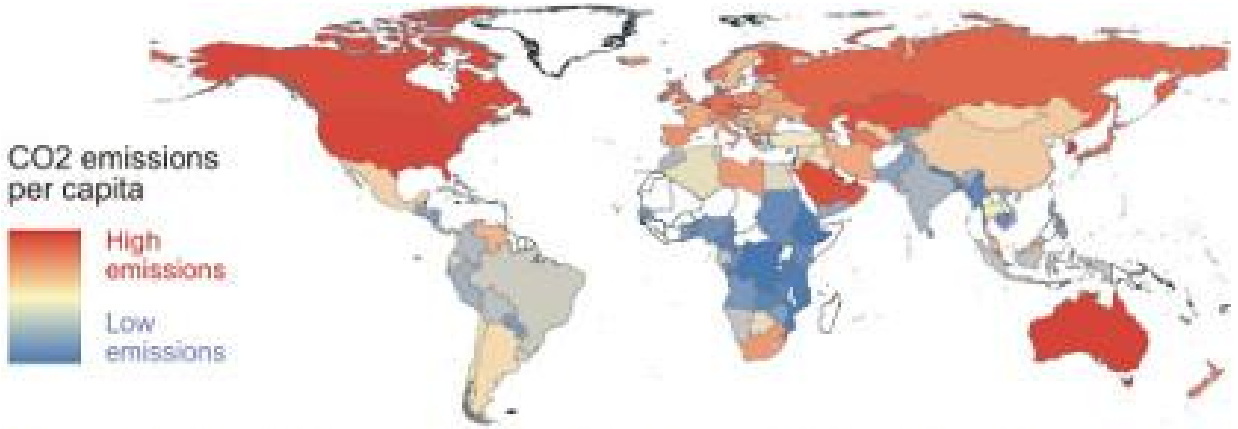
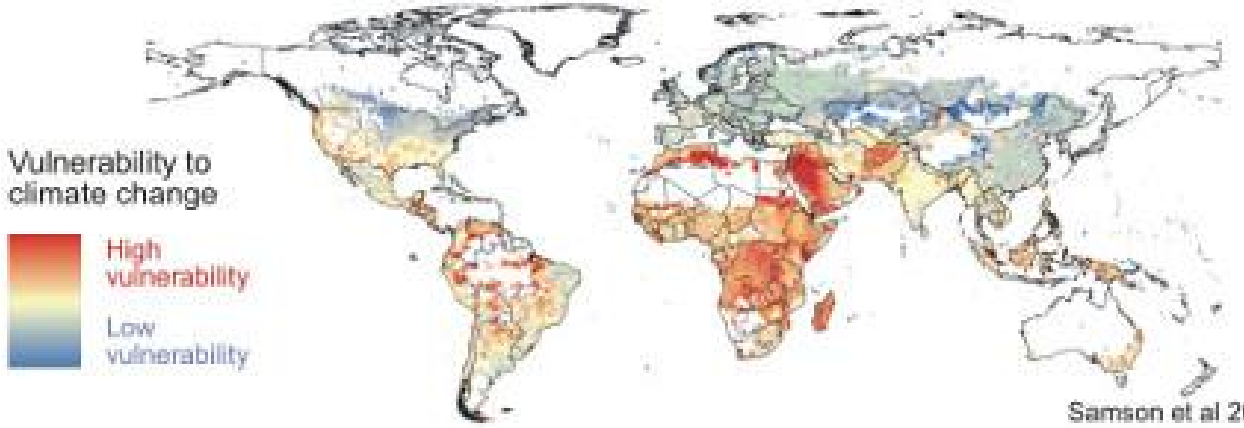
Presentation outline

- Global context
- The IPCC context and reports
- Historical development of the adaptation concept
- Conceptual explorations
- Different ways to think about adaptation
- Recent issues under development
- The merging of issues: Transformation

Who is the most vulnerable?



Those who contribute the least greenhouse gases
will be most impacted by climate change



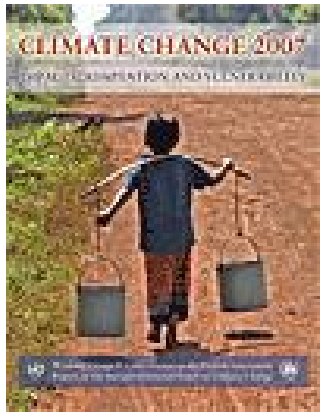
Samson et al 2011

The IPCC context

- IPCC established in 1988:
  - to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.
- Provider of authoritative knowledge of climate change related questions
- The international adaptation need
  - Financing and developing countries – developed countries = own responsibility (financially)

The IPCC Reports

- The IPCC has produced five main assessment reports in addition to several special reports
  - FAR (1990)
  - SAR (1995)
  - TAR (2001)
  - AR4 (2007)
  - AR5 (2014)



- Typical structure of the assessment reports:
  - WG I: The physical Science Basis
  - WG II: Impacts, Adaptation and Vulnerability
  - WG III: Mitigation of Climate Change
  - Synthesis Report

Initial adaptation thinking

- Adaptation viewed as ‘adjustments’ made ‘to projected or actual changes in climate’
- Adaptation seen as ‘mechanistic’ and instrumental
- Adaptation the end of the sequential process for impact assessments
- Seven step methodology in the IPCC SAR
  1. Define the problem
  2. Select method of assessment
  3. Test methods/ conduct sensitivity analysis
  4. Select and apply climate change scenarios
  5. Assess biophysical and socio-economic impacts
  6. Assess autonomous adjustments
  7. Evaluate adaptation strategies

Insights from the IPCC TAR

- Vulnerability and adaptation given more importance, shift in emphasis from “mechanistic” impact assessment
- Importance of extreme events, cross-sectoral analysis and multiple stresses
- Regional predictions still very uncertain, important phenomena not well captured (monsoon)
- Focus on adaptation, recognition of the link with development and equity issues, introduce concepts such as adaptive capacity
  - Recognition that those with least resources have the least ability to adapt

Insights from the IPCC AR4

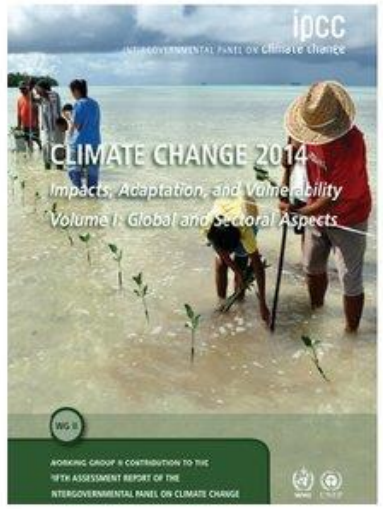
- Adaptation defined as adjustments made to ‘enhance resilience’ or ‘reduce vulnerability’
- Adaptation practices may be looked at from various perspectives:
  - Spatial scale
  - Sectors
  - Climate stress / hazard
  - Baseline economic development level of the systems they are implemented in
- Relating adaptation to adaptive capacity
  - Adaptive capacity represents potential rather than actual adaptation

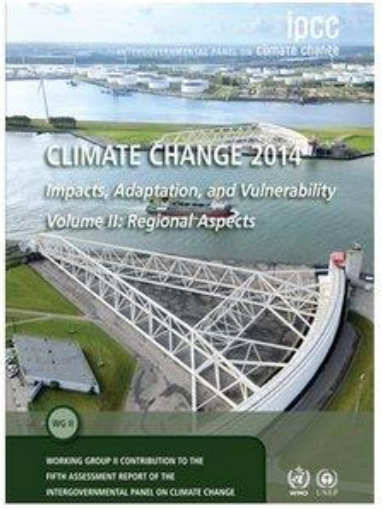
Why is adaptation important?

- Regardless of mitigation, we are faced with a significant degree of anthropogenic climate change
- Managing climate risk is likely to be important for sustainable development
  - Transformation
- For both these reasons, adaptation should be an important part of policy response to climate change

Change in adaptation perspectives

- Adaptation – from mechanistic implementation to process
- Increasing focus on the social aspects:
  - What creates vulnerability?
  - Adaptation as a social process!
  - Adaptation is *political*
  - Need to keep an eye both on direct impacts as well as on socially contingent vulnerability reduction
  - Social transformation





Key concepts

- **Adaptation**
  The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.
- **Adaptive Capacity**
  The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences
- **Exposure**
  The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected
- **Vulnerability**
  The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.
- **Hazard**
  The potential occurrence of a natural or human-induced physical event or trend, or physical impact [that may cause harm].

Conceptual relationships

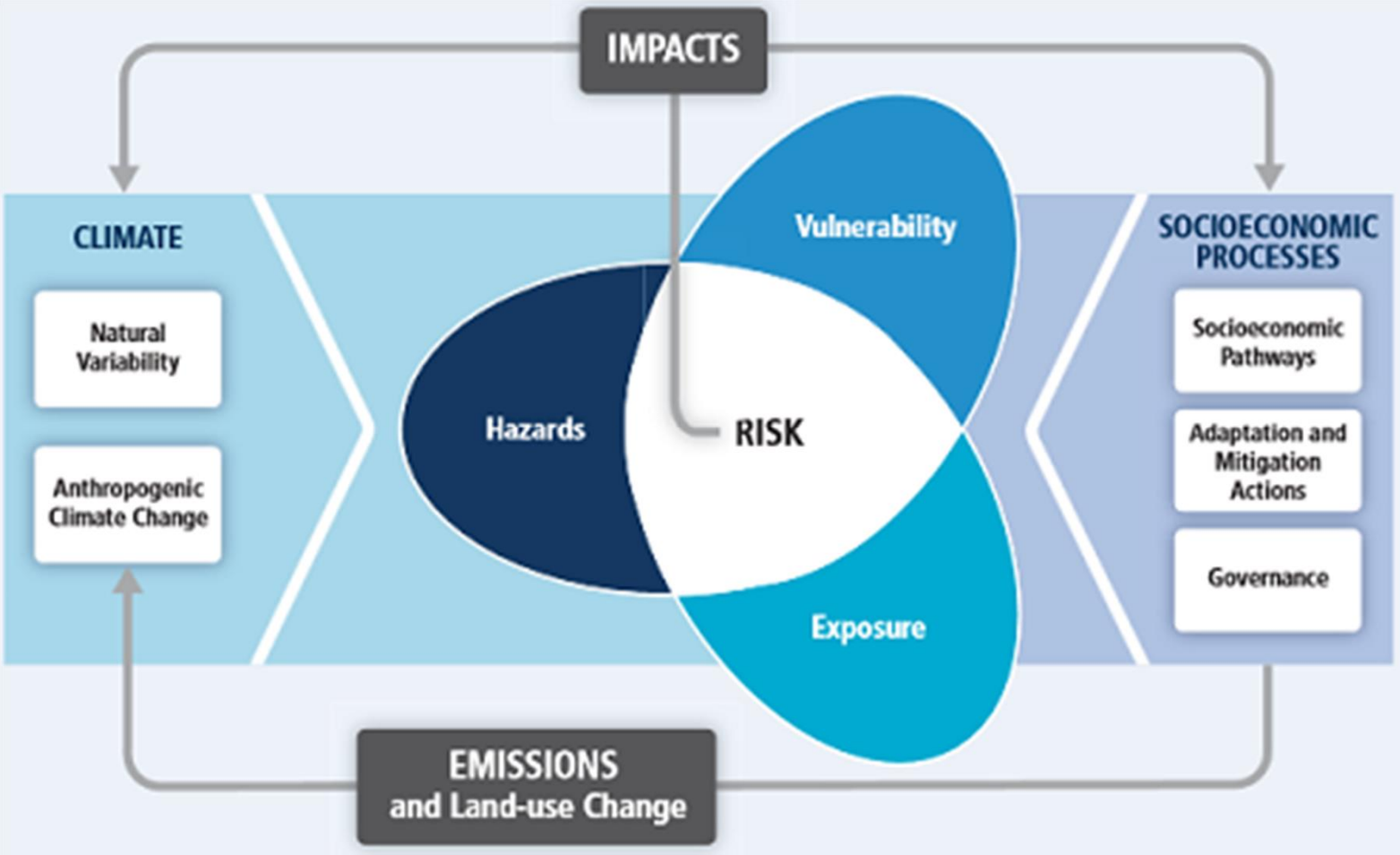
Vulnerability is often seen as a function of *Exposure* and *Adaptive Capacity*

$$V^s_{it} = f(E^s_{it}, A^s_{it})$$

Where

- V^s_{it} = vulnerability of system *i* to climate stimulus *s* in time *t*
- E^s_{it} = exposure of *i* to s in *t*
- A^s_{it} = adaptive capacity of *i* to deal with *s* in *t*.

Risk


IMPACTS
CLIMATE
Natural Variability
Anthropogenic Climate Change
Hazards
Vulnerability
RISK
Exposure
SOCIOECONOMIC PROCESSES
Socioeconomic Pathways
Adaptation and Mitigation Actions
Governance
EMISSIONS and Land-use Change

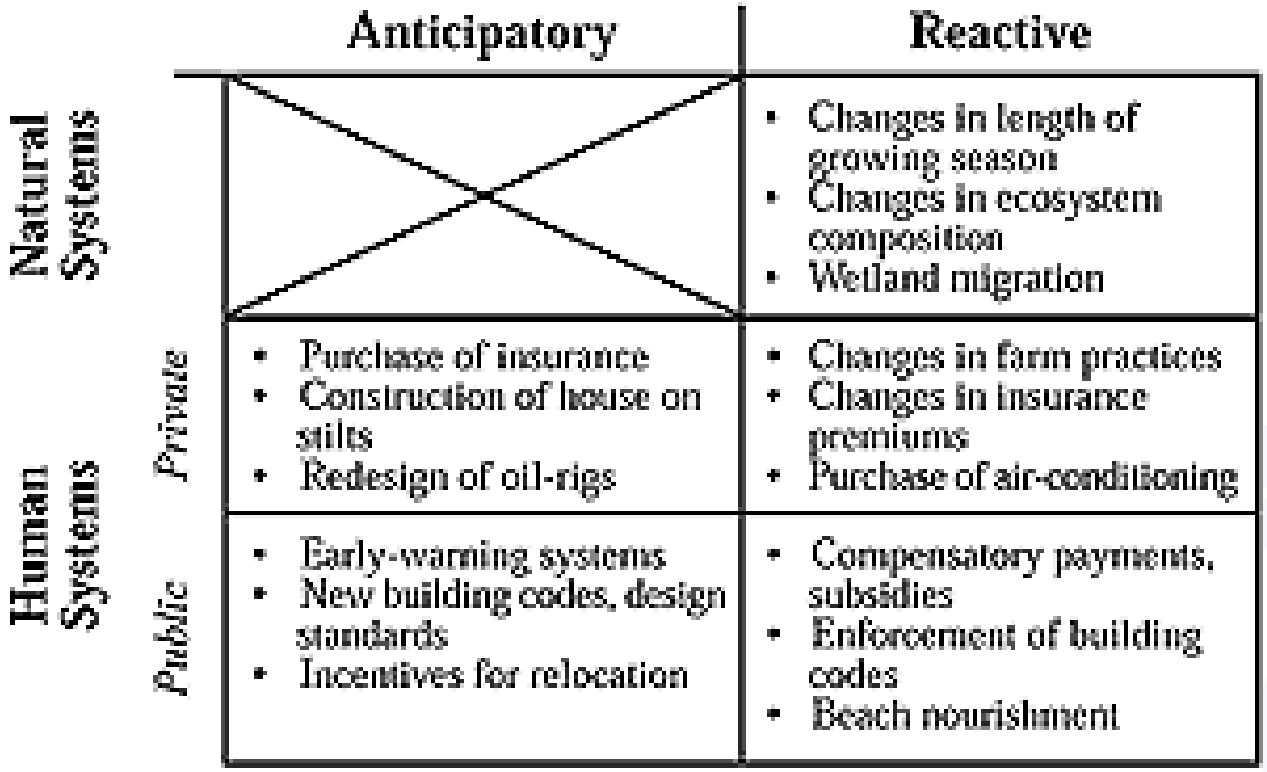
Range of adaptation responses

Classification	Examples
Bear the costs	Accept the costs because it is the most effective choice or because there is no other choice
Share the losses	Use insurance or government relief, or community or family sharing
Prevent or modify the events or the impacts	Change the actual physical events themselves (e.g. flood control; irrigation projects) or change human use activities (e.g. regulate flood plain land use; use drought-tolerant crops)
Change the use of natural resources and relocate socio-economic systems	Use flood plains for recreation, parking areas or wildlife instead of agriculture or housing; avoid expanding agriculture into unsustainable moisture-deficit regions
Research and/or restore	Study adaptation alternatives, identify new alternatives, remedy past mistakes

Adaptation time-scale

- Anticipatory adaptation to climate change risks may take place at three levels:
  - Adaptation to current variability
  - For observed medium change/variability
  - Long-term changes
- Responses across the three levels are intertwined, perhaps even as a continuum
- Visible shift of emphasis from first level to the second and third levels
- Increasing examples of measures taken to cope with the impacts of observed trends in climate, as well as scenarios of climate change
  - Thames Barrier in UK
  - Copenhagen metro in Denmark

Classifying adaptation measures



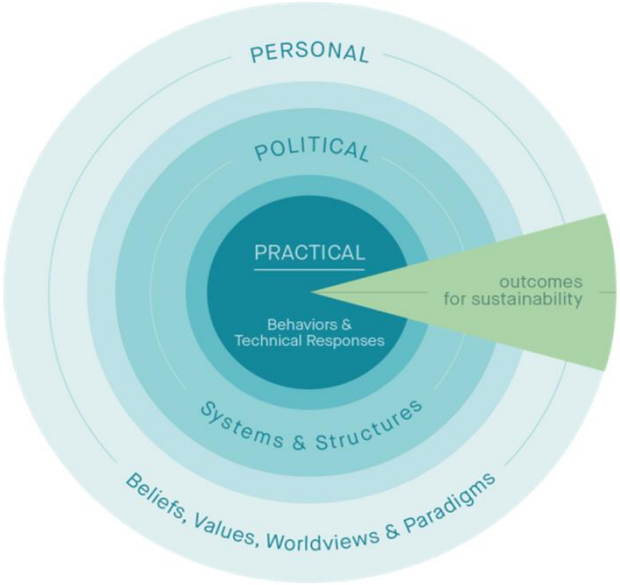
		Anticipatory	Reactive
Natural Systems			• Changes in length of growing season • Changes in ecosystem composition • Wetland migration
Human Systems	*Private*	• Purchase of insurance • Construction of house on stilts • Redesign of oil-rigs	• Changes in farm practices • Changes in insurance premiums • Purchase of air-conditioning
	Public	• Early-warning systems • New building codes, design standards • Incentives for relocation	• Compensatory payments, subsidies • Enforcement of building codes • Beach nourishment

Evolving ideas on adaptation

- Adaptation as an element of scenario-impact assessments
- Impact- (technical response mechanism) Vs. Vulnerability based
  - Vulnerability and adaptive capacity as central themes
  - Political and social dimensions
- Adaptation mainstreaming in public administration
  - Structuring and formulating adaptation policies
  - Are “win-win solutions” sufficient or even feasible?
  - Indicators and measuring adaptation
- Barriers to adaptation (adaptive capacity)
- Transformation

Transformation through adaptation

- …A change in the fundamental attributes of natural and human systems… Transformation could reflect strengthened, altered, or aligned paradigms, goals, or values towards promoting adaptation for sustainable development, including poverty reduction.



Thank you!