IVM Institute for Environmental Studies

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Limits to adaptation to climate change: a risk management framework

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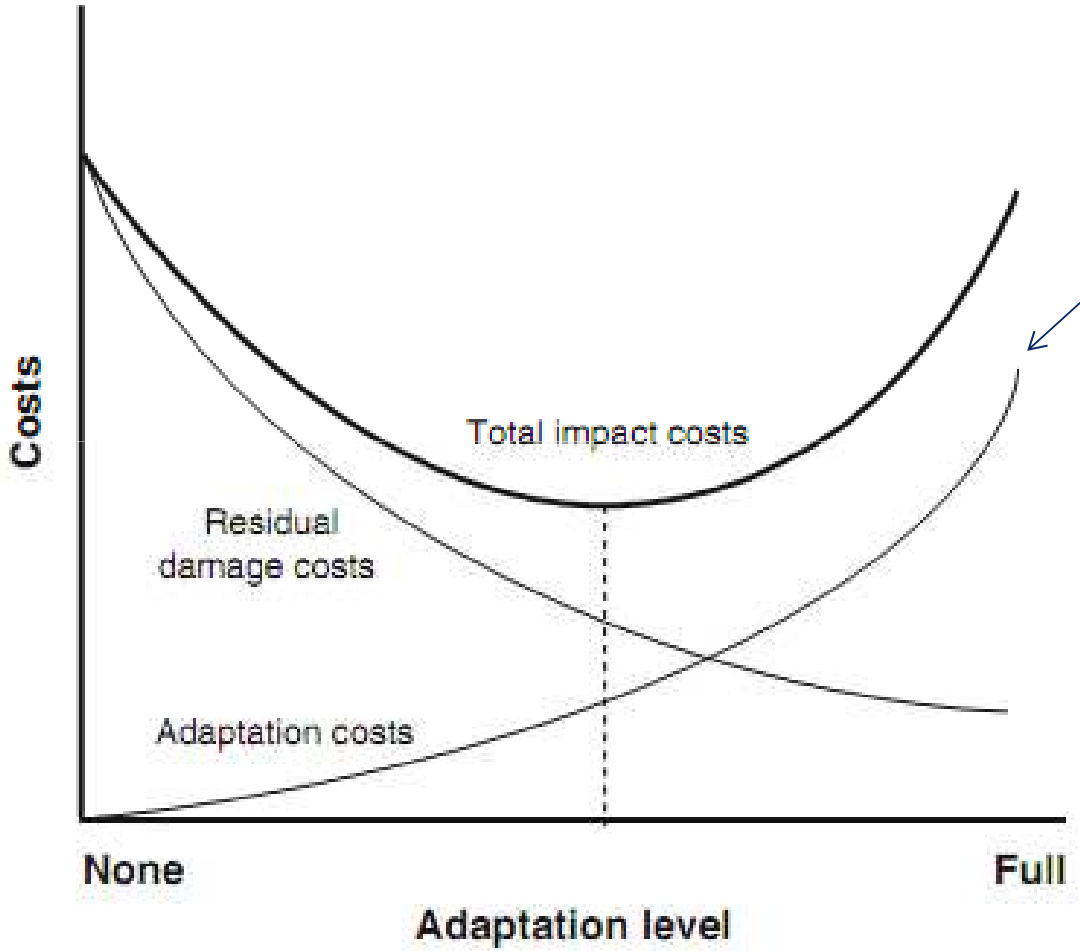
Outline

1. Why are limits to adaptation important?
2. A risk management framework for adaptation limits
3. The social context of adaptation limits
4. Adaptation limits and ‘key vulnerabilities’ to climate change
5. Mutable and absolute limits
6. Governance implications

Why limits to adaptation?

- Adaptation aims to reduce damages and exploit opportunities of climate change
- Defining limits to adaptation needs attention because:
  - It is unlikely that there is an **unlimited capacity** to adapt in many contexts
  - There are likely to be '**residual damages**' following adaptation, but there are also likely to be cases where practicable adaptation options are exhausted
  - If there are limits to adaptation, once that limit is exceeded, **damages will increase in an unmediated way**

Residual damage: an economic framework

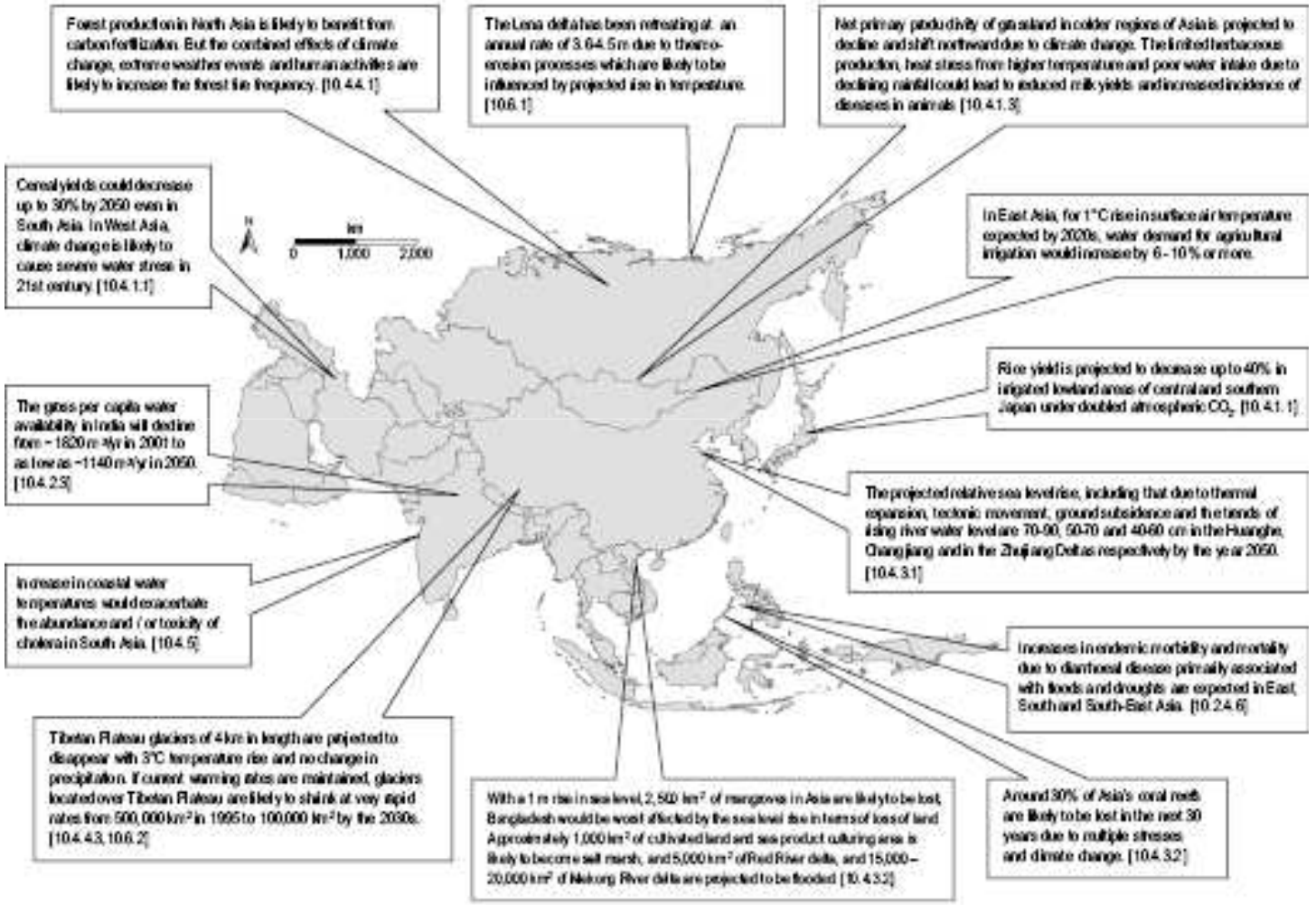


Adaptation limit?

Limits to adaptation and dangerous anthropogenic interference

- Limits to adaptation are related to the question of ‘dangerous anthropogenic interference’ with the global climate (art 2, UNFCCC). If adaptation were unlimited, there will be no dangerous anthropogenic influence, as climate-related risks would be avoided through adaptation (not counting residual damage).
- Defining adaptation limitsis therefore critical to the debate about DAI and ‘key vulnerabilities’ to climate change

Key vulnerabilities to climate change

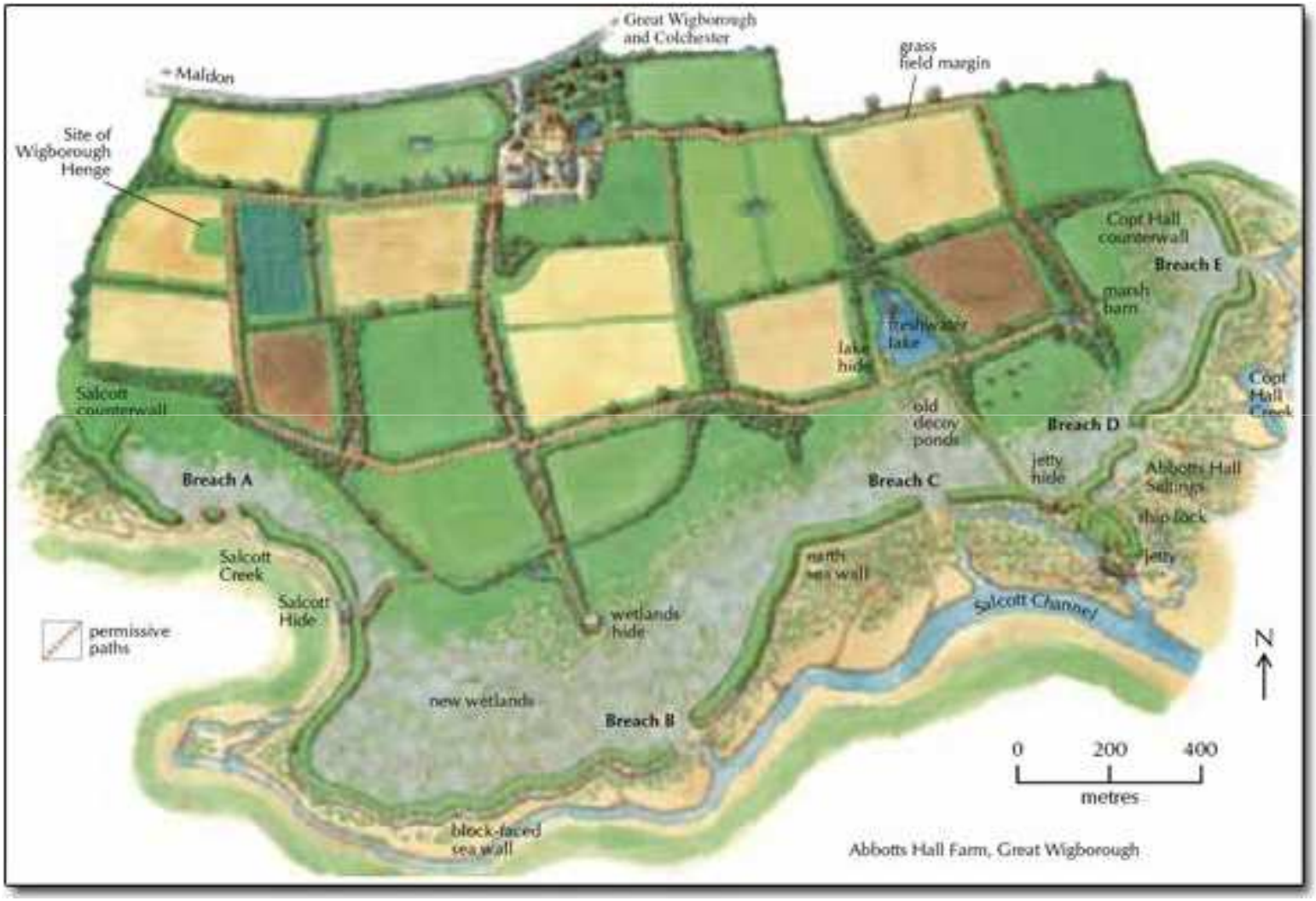


Source: IPCC, 2007

Defining a limit to adaptation

- A limit to adaptation is a point at what climate change becomes an **intolerable burden** on ecosystems, groups and individuals, leading to **discontinuities in system-states**, or **discontinuities in behaviour**
  - Transformation from rain forest to grassland
  - A farmer abandons his/her land
  - An Inuit village decides to relocate
  - An island nation chooses collective emigration

Adaptation limit?



Managed retreat, Essex, UK

Adaptation limit?

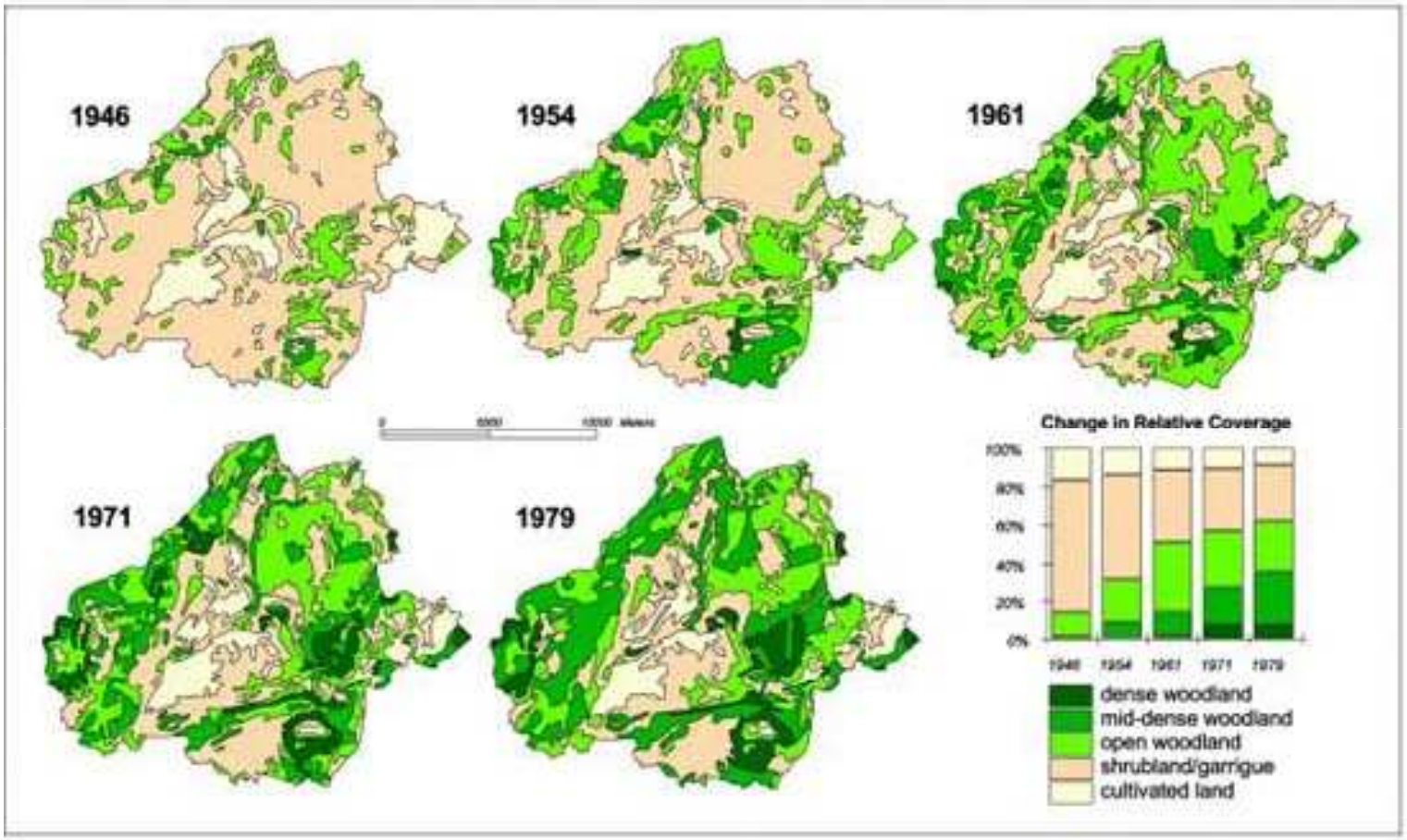


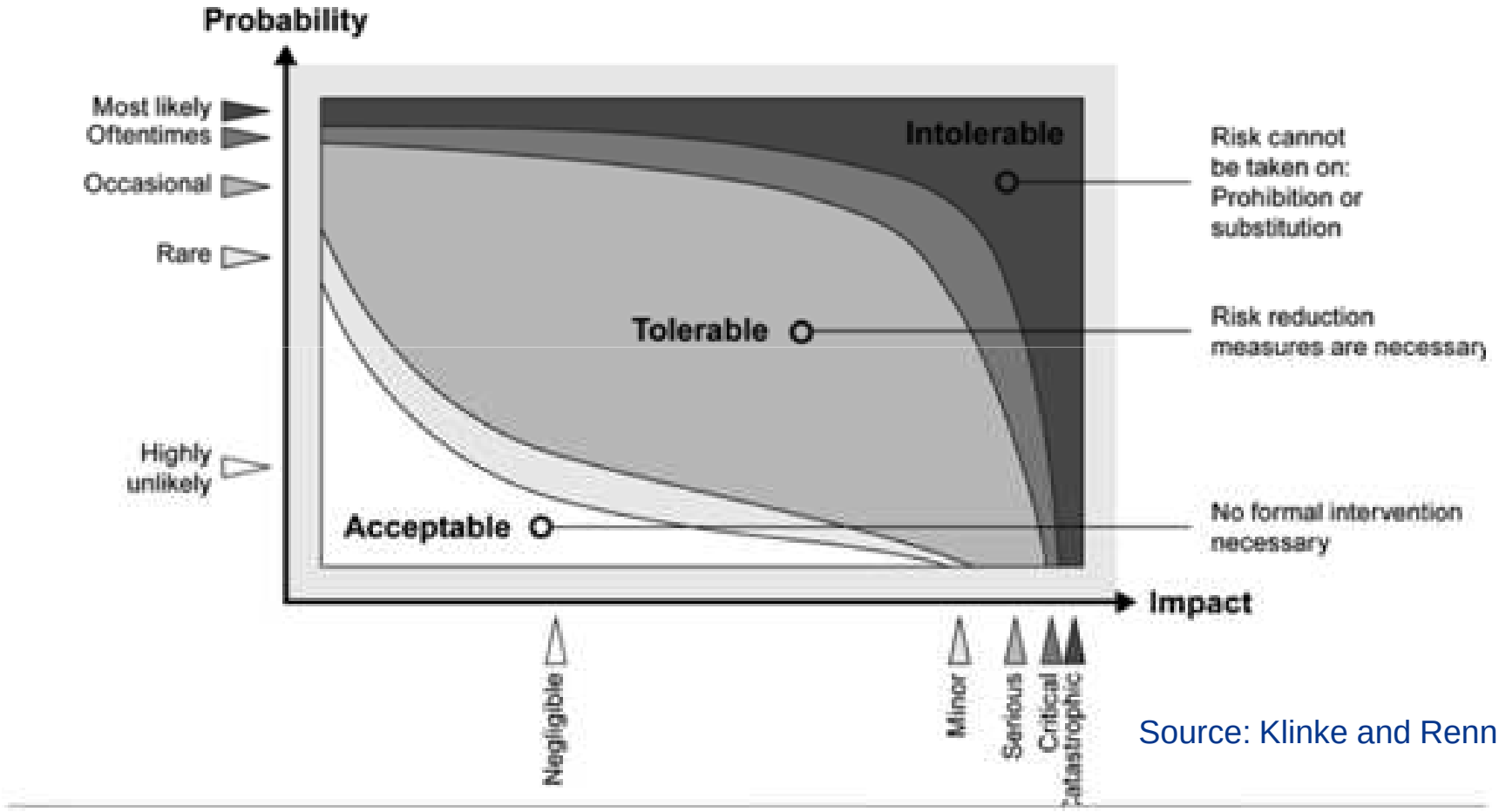
Fig. 2: Change of vegetation formations over time - Region St-Martin-de-Londres 1946-1979

Land abandonment, Southern France

A risk management framework to adaptation limits

- **Objective** of adaptation
  - To secure social objectives (standards of flood safety, safe water supplies) or 'valued qualities' (equity, social cohesion) from climate-related risk
- Climate variability and change generates **new risks to objectives and valued attributes**, addressed through adaptation
- **Up to a limit**, risks to objectives and qualities remain acceptable or tolerable, as a result of adaptive action
- At the limit, **intolerable risks** emerge to socially-negotiated norms (for flood protection), standards (e.g. cost, harm, equity, taste, aesthetics, and so on) or biophysical limits (e.g. timescale of ecosystem adaptation) **despite adaptive action**

Acceptable, tolerable and intolerable risk



Source: Klinke and Renn, 2012

Limit to adaptation: a definition

- A limit to adaptation is a situation in which an actor's (or group's) objectives and values can **no longer be secured from intolerable risks through adaptive action**
  - no feasible adaptation options exist, or an unacceptable measure of adaptive effort is required to secure social objectives and values
  - objectives and values are either **adjusted or relinquished**
- Frequently experienced by social actors as a loss of well-being, or a loss of social or cultural value (Adger et al., 2009)
  - Native Alaskan villages are relocated away from the sea and the proximity that supports important cultural practices –a sense of place and identity, traditional fishing practices

The social context of adaptation limits

- Not all values are equal:
  - Private and collective values (codified in laws, codes, conventions, cultural and symbolic values)
- (Climate) risks and adaptive action are an outcome of private capabilities, choices and circumstances, and of broader social, economic, institutional and cultural contexts
- These contexts also shape limits to adaptation:
  - Which risks are avoided? Whose risks are managed? And whose are abandoned? Limits to adaptation reveal inequities/distributional questions

Social context of limits

- Objectives and values may be traded-off against other
  - For instance, raising of a dyke against sea-level rise may be at the cost of nature protection

A distinction between adaptation limits and constraints

- Constraints to adaptation occur when an actor lacks capabilities or resources for managing climate-related risks to objectives and values. **Additional effort** is needed to adapt in order to secure risks within an acceptable or tolerable range. In principle, practicable adaptation options exist, though access to them may be constrained.
- Adaptation limits exist where there are no practicable adaptation options available to secure tolerable risks

Limits and key vulnerabilities I

- ‘Key vulnerabilities’ relate to intolerable risks to common and shared values that cannot be avoided through adaptive action.
- Key vulnerabilities exist because there are **limits to adaptation**, not because of intrinsic features of the risks themselves, such as the geographical scale of certain climate change impacts (i.e. 5 metre sea-level rise)
- Risks associated with key vulnerabilities need to be defined for the range social actors and ecosystem services affected, including a definition of potential limits to adaptation

Limits and key vulnerabilities II

- Major global-scale key vulnerabilities (THC shut-down, desertification of the Amazon) are likely to generate many, complex and poorly-defined risks for ecosystems and societies.
- Many different natural and social systems will be affected, Some may face intolerable risks to valued qualities and have no means of adapting, while others will accept new risks or have the capacity to adapt.

Mutable and absolute adaptation limits

- Over time, some limits to adaptation will be **mutable** due to:
  - Changes in **attitudes to risk** (such as accepting a lower level of flood protection)
  - Changes in **acceptability** of alternative social objectives (accepting a change in farming practice in response to drought)
  - Changes in the **resources or adaptive capacity** (for instance through increasing wealth or technological innovation)
- Some risks are unlikely ever to be tolerable (such as persistent risk of flooding of a major global city), while the resources to adapt to some risks are unlikely ever to be available (to build major dykes around low-lying island states) - these may be seen as **absolute limits to adaptation**

Governance implications

- Governance is concerned with securing valued qualities, norms, standards (both shared or particular) and avoiding biophysical limits
- Intolerable risks to these values and objectives therefore mark a threshold: a point at which public-private resources and processes no longer secure such values
- Adaptation limits may impose an *involuntary choice* to abandon a social objective as a result of an intolerable and 'unmanageable' risks - 'prohibition' of CC is not an option!
- Cultural values and objectives, and risks to them, mean that adaptation limits raise important distributional questions (who gets to maintain things of value?)

Governance implications

- Social conflicts over adaptation limits are likely to be expensive, time-consuming, politically-charged, especially because they are contests about the redistribution of risks and debates over cultural and social values
- Looking forward, we can predict a large and growing ‘governance burden’ of emergent social and political disputes around adaptation limits, at local and at national and international levels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