



# Climate Change Impacts, Vulnerability and Adaptation

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## Definitions

- **Vulnerability: The propensity or predisposition to be adversely affected.** Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt
- **Impacts: Effects on natural and human systems of extreme weather and climate events and of climate change.** Impacts generally refer to effects on lives, livelihoods, health status, ecosystems, economic, social, and cultural assets, services (including environmental), and infrastructure... The impacts of climate change on geophysical systems, including floods, droughts, and sea-level rise, are a subset of impacts called physical impacts.



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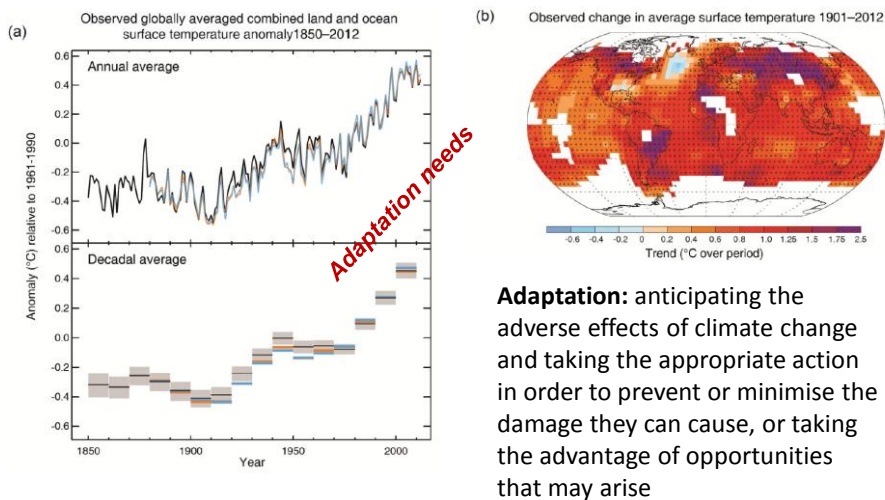


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# IPCC References



## Past climate and adaptation needs



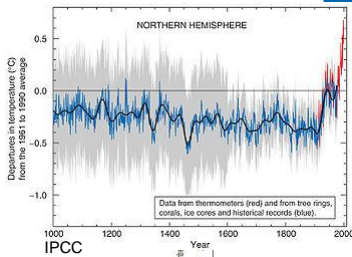
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 IPCC AR5, 2013

# Instability and uncertainty: not just climate

## Prices of Agricultural commodities

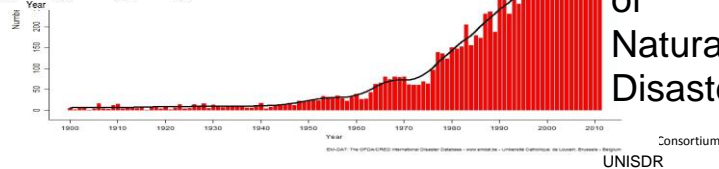


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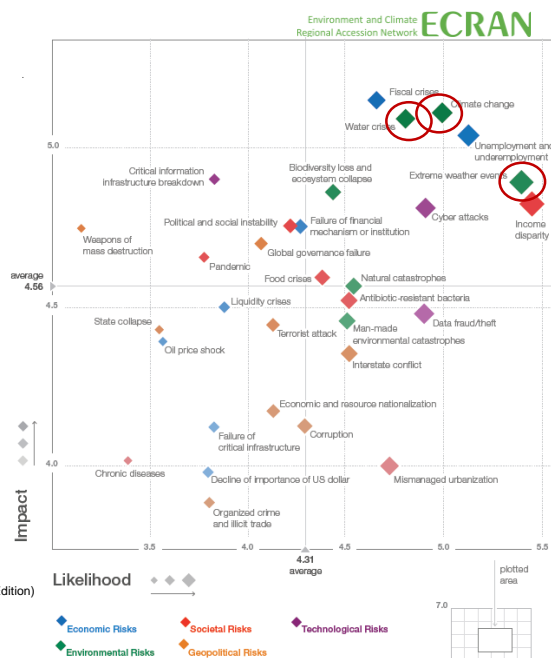


## CO<sub>2</sub> concentrations in the atmosphere

## Number of Natural Disasters

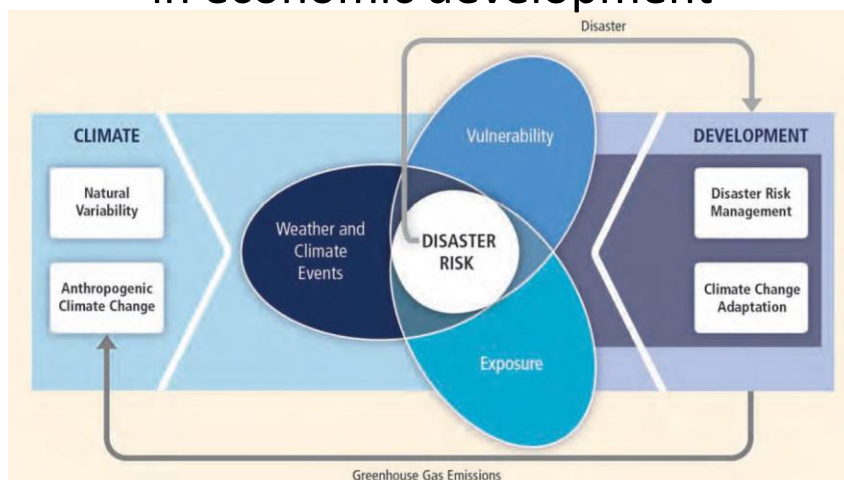


## Global Risks Landscape 2014



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# Climate change risks and adaptation in economic development



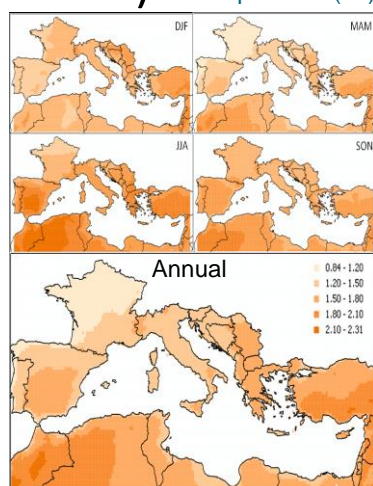
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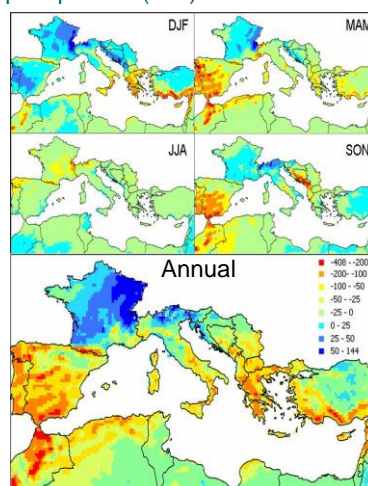
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IPCC SREX 2012

## Future climate change scenarios (2050 vs. 2000)



precipitation (mm)



Source: WASSERMed project (EC-FP7-ENV)

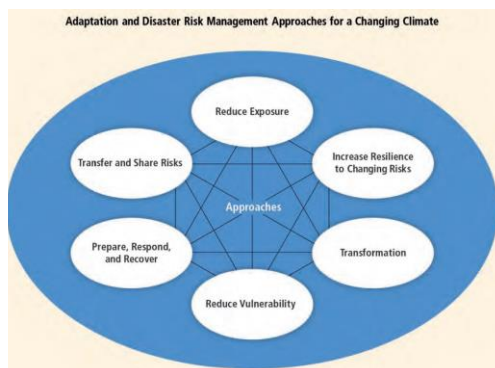
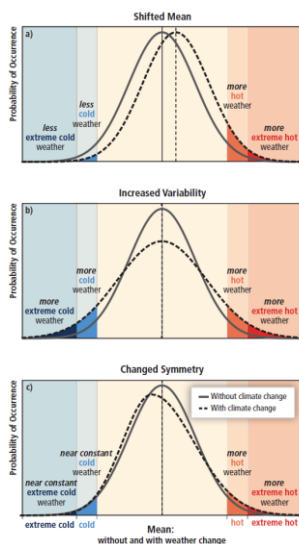


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# Management of climate risk & adaptation



IPCC SREX 2012

$$R = f(H, V, E)$$

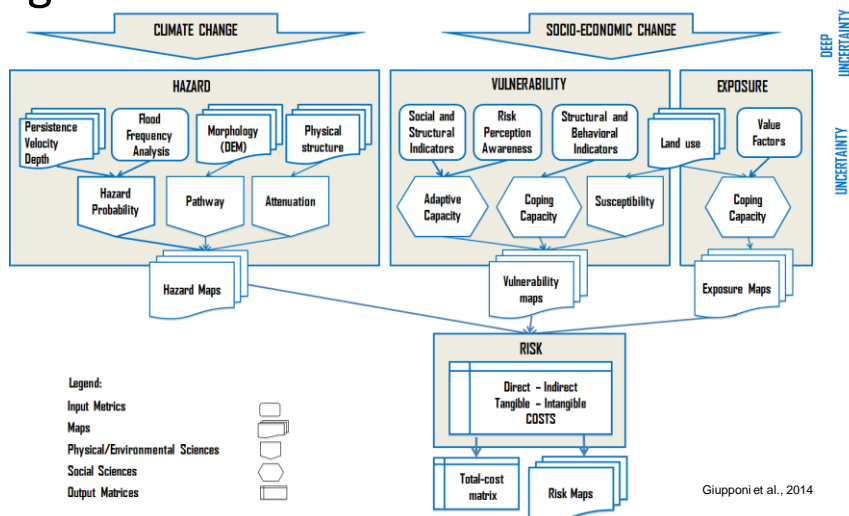


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## KULTURisk Framework for integrated risk assessment



Giupponi et al., 2014

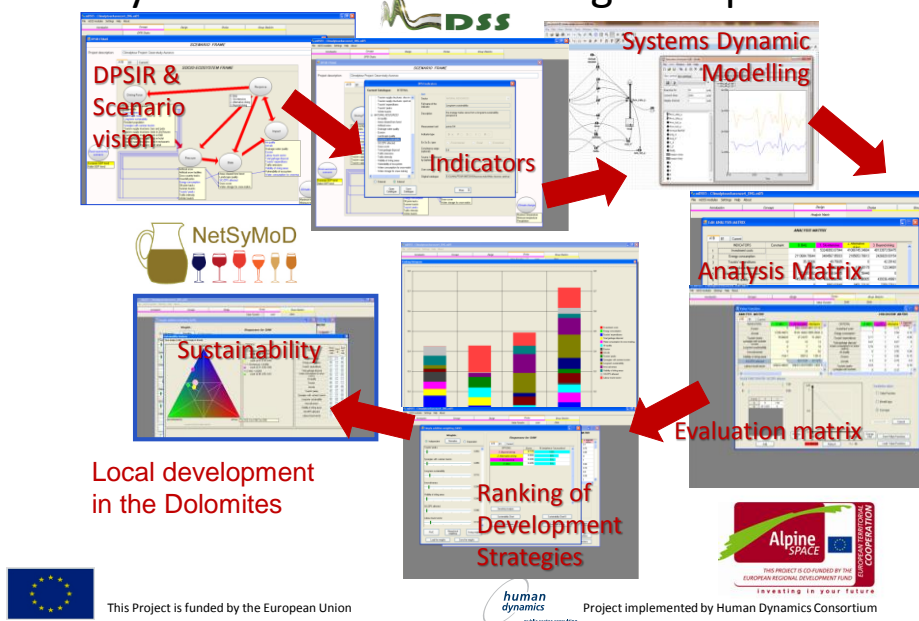


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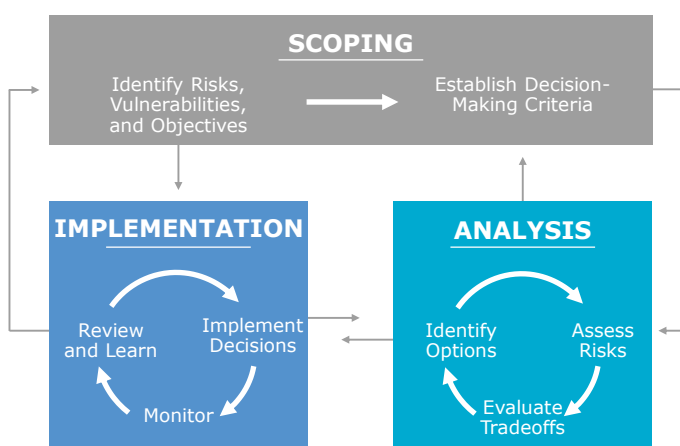


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# Analysis of alternative strategies in practice



## «Climate proofing»



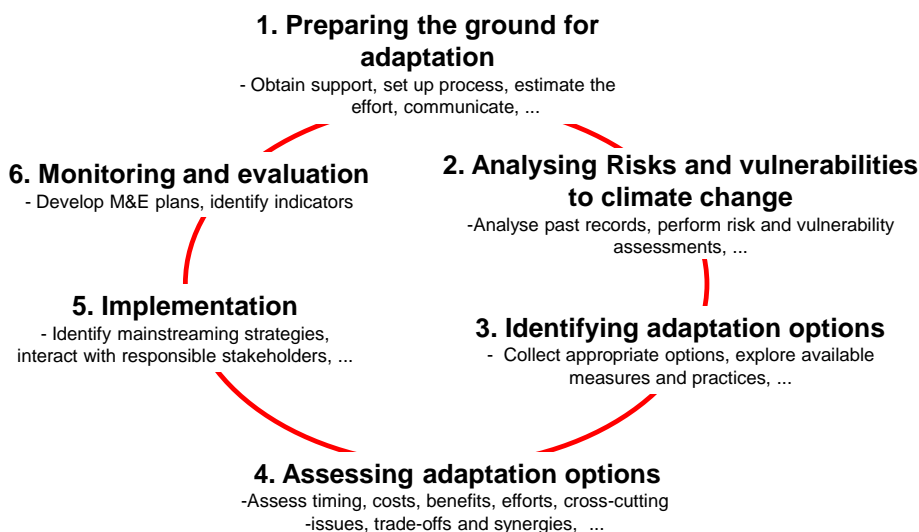
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# EU guidelines for CCA strategies



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SWD(2013) 134 final

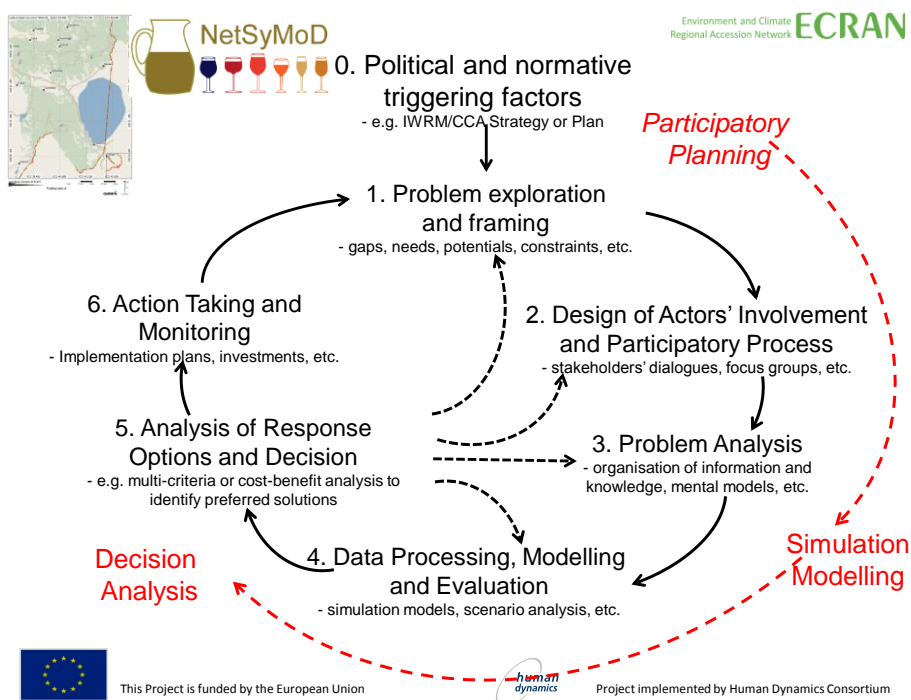


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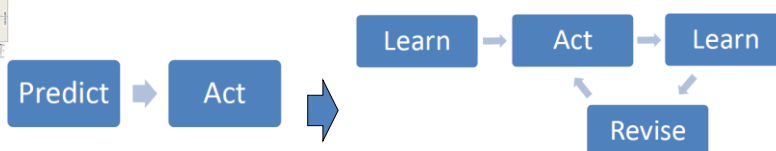


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## Optimal vs. Robust Decision Making



- A **robust decision process** implies the selection of a project or plan which meets its intended goals – e.g., increase access to safe water – across a variety of plausible futures.
1. We first look at the **vulnerabilities** of a plan (or set of possible plans) to a field of possible variables.
  2. We then identify a set of **plausible futures**, incorporating sets of the variables examined, and evaluate the performance of each plan under each future.
  3. Finally, we can identify **which plans are robust to the futures** deemed likely or otherwise important to consider.



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Hallegatte et al., 2014





Environment and Climate **ECRAN**  
Regional Accession Network

## Ecosystem management for CCA and IWRM

- “**Ecosystem-based Adaptation**, uses biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels” (UNEP).
- Well-managed water and watershed-based resources provide high levels of **ecosystem services**.
- ***In essence, ES valuation and management are practical ways of achieving both IWRM goals and additional benefits (CCA, biodiversity protection, etc.).***



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## Concluding remarks

- Increasing level of complexity, but also increasing opportunities for synergistic effects
- Climate proofing and integration of sector policies
- Integration of economic, social and environmental dimensions in decision making
- Policy and decision making as – participatory – processes



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Thank you for your  
attention!

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