Adaptation Futures 2016

How do models treat climate change adaptation?

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Overview

- Adaptation
- Methodology
- Findings
- Conclusions

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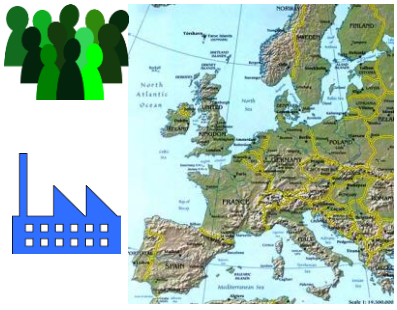
Context

Now **Future**





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Context

Now **Future**




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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** (IPCC AR5).
- Adaptation **limit** - the point at which an actor's objectives (or system needs) cannot be secured from intolerable risks through adaptive actions.
- Adaptive capacity - the **ability** of systems, institutions, humans and other organisms **to adjust** to potential damage, to take advantage of opportunities, or to respond to consequences

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** (IPCC AR5).

Adaptation:
- Is a process (it doesn't just happen)
- Triggered by harm or opportunities (not just by change)
- Has limits
- Has constraints

- Adaptive capacity - the **ability** of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences

Methodology

- Literature review (*modelname + adapt* + climate change*)
  - Focus on water models
- Broad range of model types – physically-based; systems; ABM

SWAT [12] SWIM [6] WASIM [0] MIKE [0] HBV [0] VIC [1] WaterGAP [5]
WEAP [14] Aquator [0] WSBM [1] WMS [0] InfoWorks [0]
HEC-RAS [1] LisFLOOD [2]
DANUBIA [1] ABM [6]

- Assessed how adaptation was represented, triggered and parameterised in model applications

Adaptation responses modelled

Demand

Agriculture
Changing irrigated crop area
Changing irrigation depth;
Irrigation efficiency / technology change
Sowing / harvesting dates
Crop change (inc agroforestry)
Water re-use

Domestic
Water tariffs / pricing
Subsidies for water efficient appliances
Information
Restrictions

Environment
Changing EFlow allocation
Grazing management, buffer strips and nutrient management
Afforestation
Water rights

Industry
Power generation technology change
Investment (snowmaking / irrigation)

Flood risk management
Increasing adaptive capacity
Improving flood defence standards
Wetland creation; Ponds
SUDS

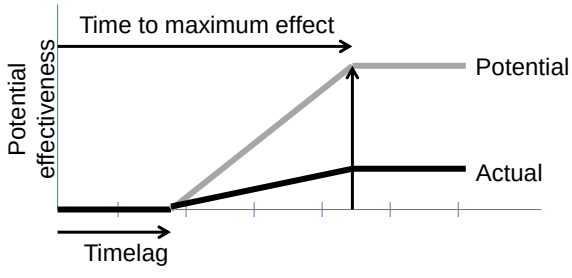
Supply
Water transfers / imports
Groundwater use
Reservoir construction
Desalination
Reservoir release curves
Supply integration

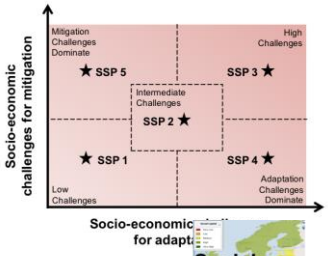
Generalized findings

Modelled adaptation within the water-sector

- is triggered by change (not by impacts or vulnerability)
- but unclear whether reactive or anticipatory
- doesn't have an objective – 'look-see'
- happens immediately
- has unlimited financial resources
- has uniform and high uptake (some ABM exceptions)
- is unaffected by socio-economic context
- happens within a low uncertainty future (climate and socio-economic)

The IMPRESSIONS approach





Actual (% of potential)	Adaptive capacity (based on class of limiting capital)				
Importance of adaptation option within scenario:	Very low	Low	Medium	High	Very High
Low	5	10	25	50	75
Medium	10	25	50	75	90
High	25	50	75	90	95

Conclusions

Modellers need to better represent adaptation characteristics:

- Timing of decisions 
- Triggers 
- Objectives / goals 
- Effectiveness 
  - Time 
  - Constraints 
- Uptake 

to improve our understanding of the effects of adaptation

Acknowledgements

IMPRESSIONS: **Imp**acts and **R**isks from High-**E**nd **S**cenarios: **S**trategies for **I**nnovative Soluti**ons**

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