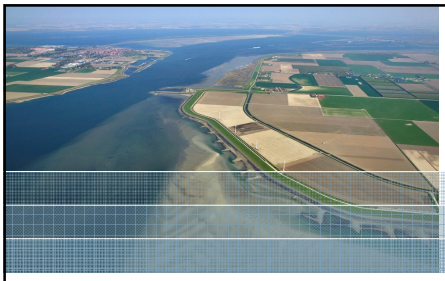

Deltares
Enabling Delta Life

Climate adaptation navigator: design and analysis of adaptation strategies

Dr. ir. Saskia Hommes, Dr. Marcel Marchand, drs. Ies de Vries and ir. Herman van der Most

Conference "Deltas in times of climate change"
Rotterdam

30 September 2010

Climate adaptation

- Deltas influenced by climate change:
  - Sea level rise → increases salt intrusion
  - River discharge changes
- Adaptation to climate change needed
- Adaptation strategies: spatial planning *and* participatory approach (multi-actor process) → Climate adaptation navigator

Climate adaptation navigator

- Combination of two layer approaches: spatial & institutional
- Spatial planning: adaptation in what layers?
- Institutional layers: who is steering adaptation? what are steering mechanisms
- Climate adaptation navigator: What is needed to implement adaptation strategy? (steering mechanisms)

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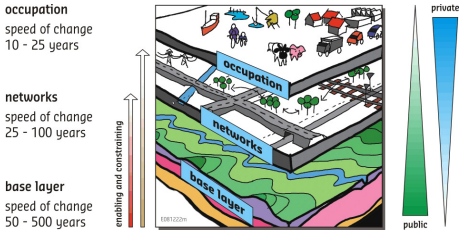
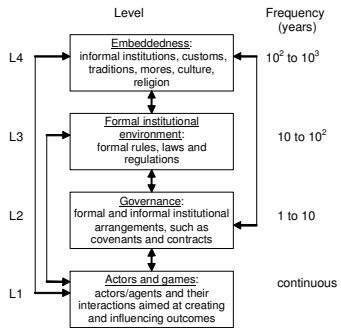
Climate adaptation navigator

Based on combination between two layer approaches:



Spatial layers (VROM)



Institutional layers (Williamson)

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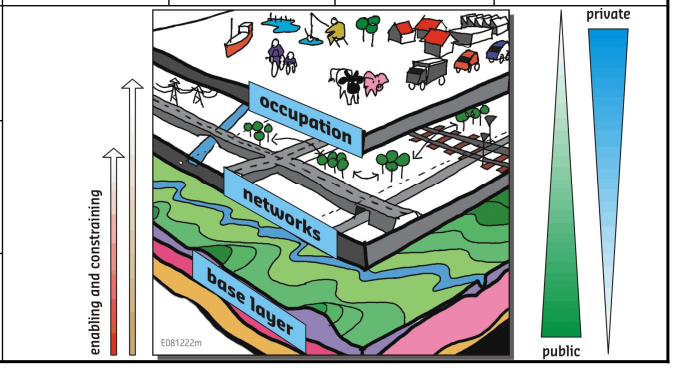
Climate adaptation navigator

INSTITUTIONAL LAYERS

SPATIAL LAYERS	Actors and interactions	Agreements and contracts	Laws and regulations	Culture, traditions
Occupation				
Network				
Base				

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Climate adaptation navigator

	Actors and interactions	Agreements and contracts	Laws and regulations	Culture, traditions
Occupation	Short-term adaptation (private)			
Network				*Collective and individual 'drivers' to climate adaptation*
Base	*Enabling and constraining conditions for climate adaptation*			Long-term adaptation (public)

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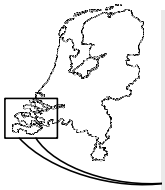
Example: South western Delta

THE NETHERLANDS



•Deltaworks:
- Safety
- Ecological problems

•Future: Climate change and estuarine dynamics (policy measure)

•Freshwater supply agriculture?

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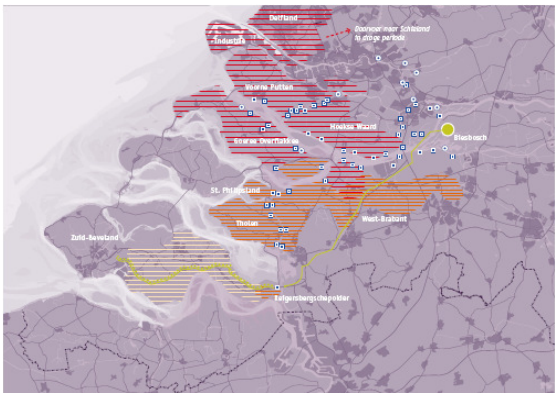
Freshwater dependence in SW Delta

- Mostly agriculture
- Dependent on freshwater
- Freshwater availability may change in near future



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Climate adaptation strategies SW Delta

- *What are strategies (navigation routes) to climate adaptation?*

1. Moving along with salt intrusion by climate change
2. Combat salt intrusion

- *What "steering" mechanisms for implementation?*

→ Apply climate adaptation navigator

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Strategy 1: moving along

	Actors and interactions	Agreements and contracts	Laws and regulations	Culture, traditions
Occupation	Switch to salt tolerant crops			
Network	↑			
Base	Adapt to higher salt concentration	←	Switch strategy: no longer combat salt intrusion	

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Strategy 1: moving along, private response

	Actors and interactions	Agreements and contracts	Laws and regulations	Culture, traditions
Occupation	Continue fresh-water agriculture			
Network	**Disconnection**	Alternative fresh-water supply through arrangements		
Base	Adapt to higher salt concentration		Switch strategy: no longer combat salt intrusion	

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Strategy 2: combat salt intrusion

	Actors and interactions	Agreements and contracts	Laws and regulations	Culture, traditions
Occupation	Continue, increase fresh-water agriculture			
Network	Prevent salt intrusion, by adapting infrastructure	Pricing		
Base			Combat salt intrusion	

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3x4 matrix for analysis & design

	Actors and interactions	Agreements and contracts	Laws and regulations	Culture, traditions
Occupation	Private investments	Land ownership	Policies on spatial zoning	Entrepre-neurship
Network	Public and private investments	Public agencies own and manage water networks	Government agencies as main responsible institute	Government task to provide utility networks
Base	Public management and maintance, e.g. nature restoration	Groundwater licenses	Water Framework Directive	Water is a public good

Marchand & Ruijgh-vd Ploeg, 2009

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Conclusions: Climate adaptation navigator

- Spatial planning: adaptation in what layers?
- Institutional layers: who is steering adaptation?
- Climate adaptation navigator:
  - What is needed to implement adaptation strategy? (steering mechanisms)
  - Use navigator to design strategies for climate adaptation (future)

- Future plans: apply to case study for waterboard Zuiderzeeland

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