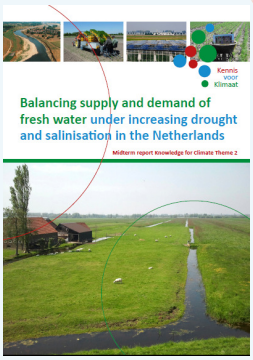
Balancing supply and demand of fresh water

under increasing drought and salinisation in the Netherlands



Midterm review, Knowledge for climate theme 2
Amsterdam October 4, 2012

Kennis voor Klimaat Knowledge for Climate

The consortium Climate proof fresh water supply (CPFWS)

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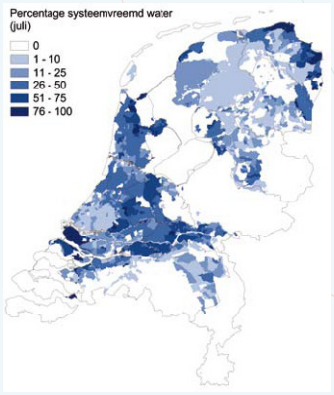
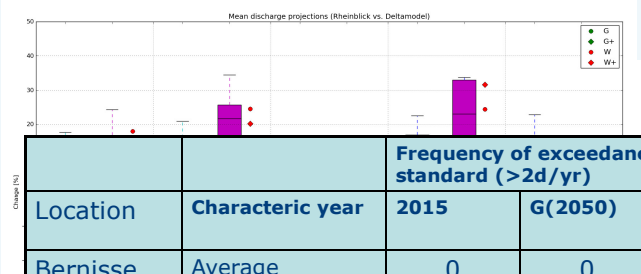
Content

- The Dutch fresh water challenge
- The scope of the CPFWS
- Vision and research questions
- Some intermediate results

Large dependance on external supply in summer



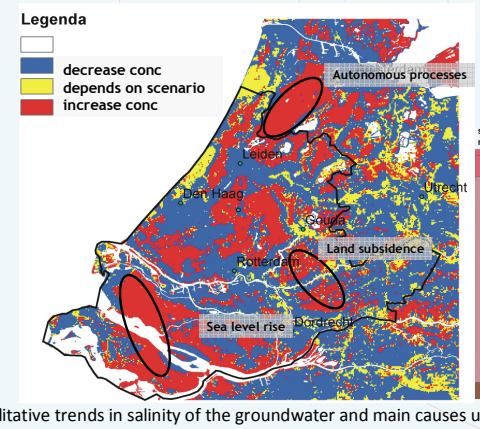
Potentially large but uncertain threats

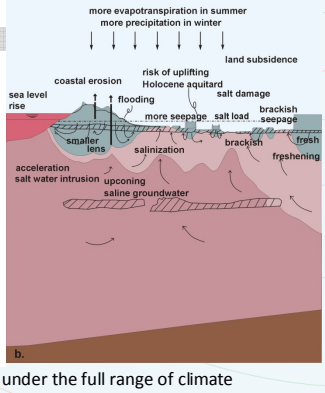


		Frequency of exceedance Chlorine standard (>2d/yr)		
Location	Characteric year	2015	G(2050)	W+(2050)
Bernisse (150 mg/l)	Average	0	0	0
	Dry	0	0	0
	Extreme	14	11	14
Gouda (250 mg/l)	Average	0	0	9
	Dry	0	0	24
	Extreme	42	46	87

Ground water effects

Effect climate scenarios in 2075 on salinity





Qualitative trends in salinity of the groundwater and main causes under the full range of climate scenarios provided by KNMI (KNMI, 2006). Not every change is climate induced (Oude Essink et al., 2010).

Delta Program

Two main goals for water management of our national government:

- To protect The Netherlands from flooding
- **To make Fresh Water Supply Climate Change Proof**

Assessing the effects of:

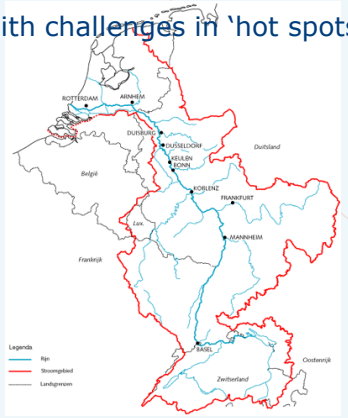
- Changing water management (SWD saline again, Ijssel lake higher water level)
- Droughts
- Land subsidence
- Sea level rise and change precipitation pattern
- Adaptive and mitigative strategies

Tools: Delta model and Netherlands Hydrological modeling Instrument

ALTERRA Deltares PBL stowa

Scope of research

- In depth research is more important than comprehensiveness
- Specific niche in relation to Delta program
- Therefore focus is on low lying parts of the country subject to salinisation
- Link with challenges in 'hot spots'



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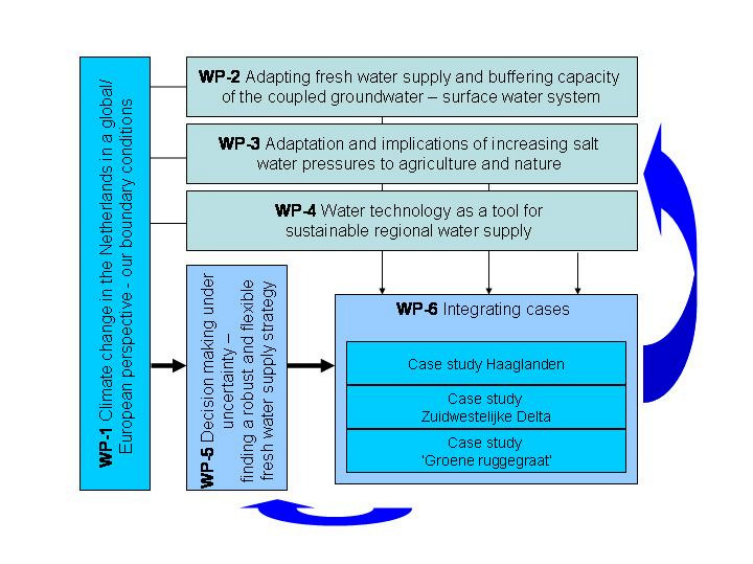
Vision and approach

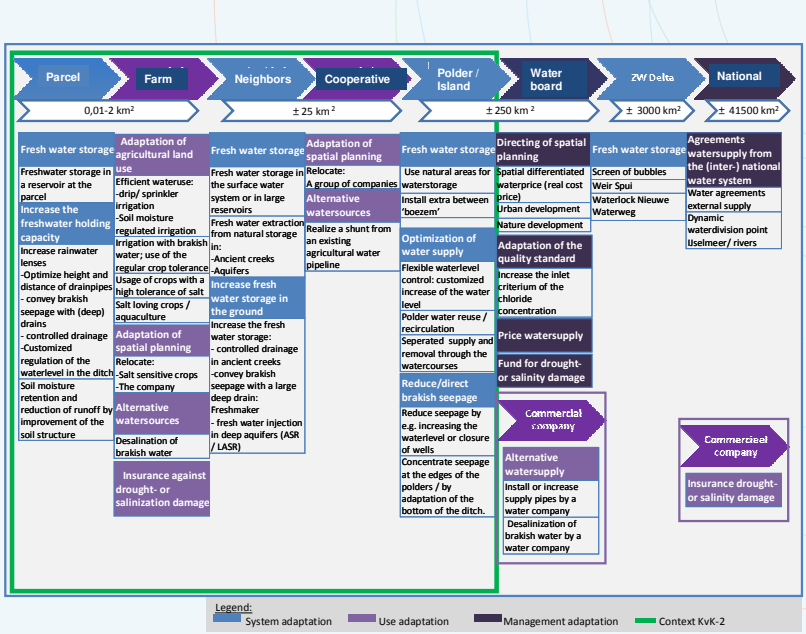
Mismatch between supply and demand in time and space can be bridged by creating a more robust system that not only relies on external water supply but on a broader mix of sources and buffers on a local to national level.

Approach of CPFWS:

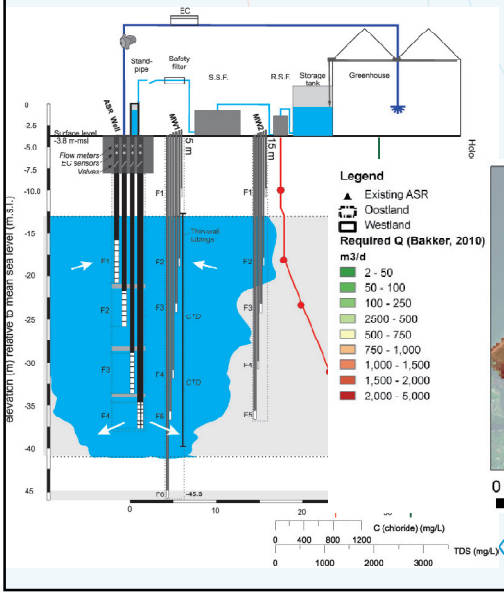
- to add more in depth insight in:
  - The main causes of change
  - The system's reaction to these changes
  - The main uncertainties in assessing drought risk
  - The perception and reaction to drought risks.
- provide knowledge to assess local to regional options with more national scale options (upscaling)
- providing practical applicable knowledge by working together with stakeholders on pilot projects.

Research questions

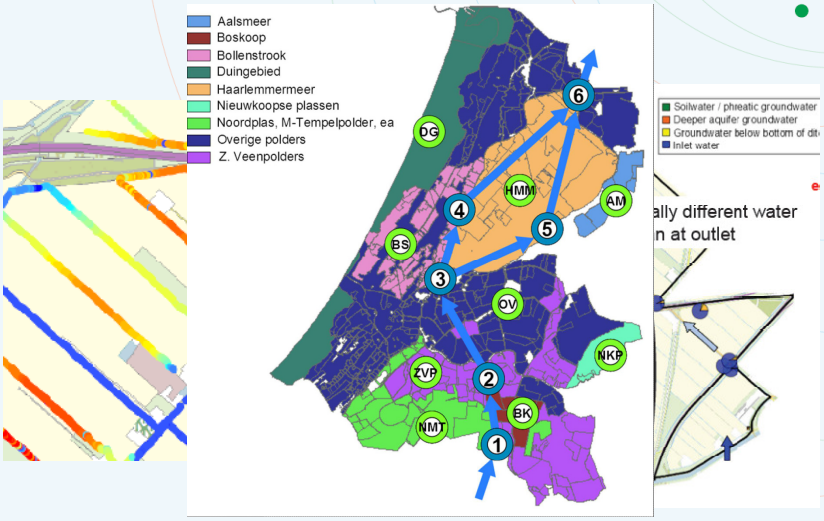




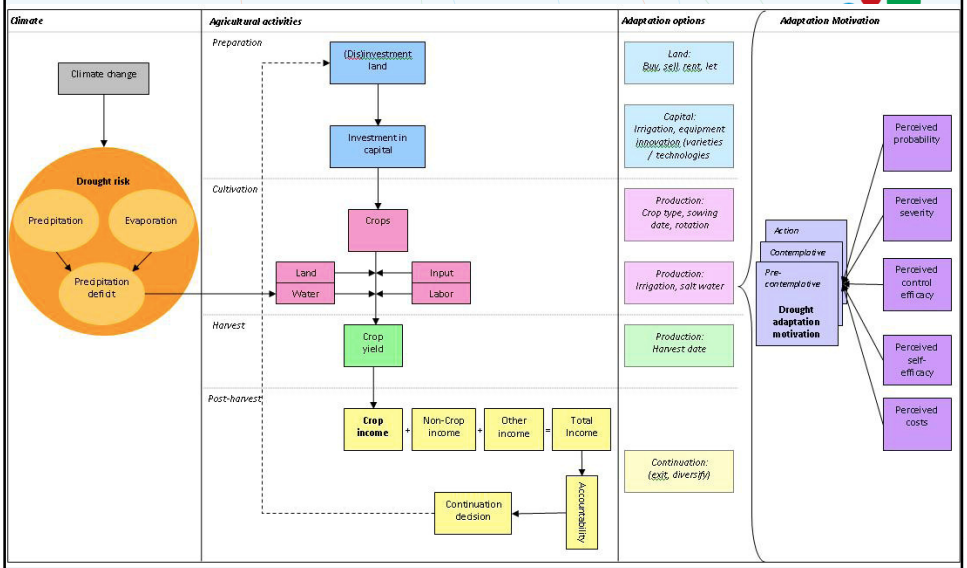
Some example results (1)



Some example results (2)



Some example results (3)



Example (4) salt tolerance aquatic system

• Water framework Directive objectives in Schieland: up til 600 mg/l small effects on **water plants and fish**.

• Not only chlorine and associated ions of major influence, also nutrients

•New research started on floating fens (Natura 2000, Nieuwkoop)

Can we use tolerance levels in a more flexible way?

To conclude

- Halfway
- Looking for possibilities for increasing robustness of the system
- First results on:
  - Field experiments
  - Upstream water use
  - Improved modeling: a.o rain water lenses, salt tolerance
  - Events, societal and scientific
  - Case studies
- When looking ahead:
  - Further development of vision and main concept
  - Integration of results (also across themes), upscaling of local studies,
  - International comparison of approaches