Midterm review KIT Amsterdam, October 4 2012

KfC Theme 8

Tools for adaptation

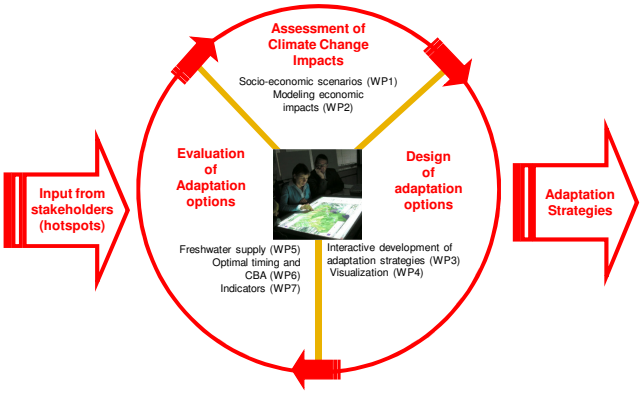
Ekko van Ierland, Consortium leader
WP leaders, PhD students and researchers

Knowledge for Climate

vrije Universiteit amsterdam

SPIN lab Spatial Information Laboratory

Coherence of the programme



SPIN lab Spatial Information Laboratory

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Workpackages

- *WP1: Integrating and downscaling national socio-economic scenarios*
- *WP2: Assessing the economic impacts of flood risks*
- *WP3: Interactive development of spatial adaptation strategies*
- *WP4: Visualization and simulation of impacts and strategies*
- *WP5: Economic modeling and assessment of the impacts of climate change and adaptation strategies on freshwater resources*
- *WP6: Optimal timing, cost benefit analysis and adaptation strategies*
- *WP7: Monitoring and evaluation*

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Knowledge for Climate Theme 8 WP1

KfC Theme 8 – WP1:

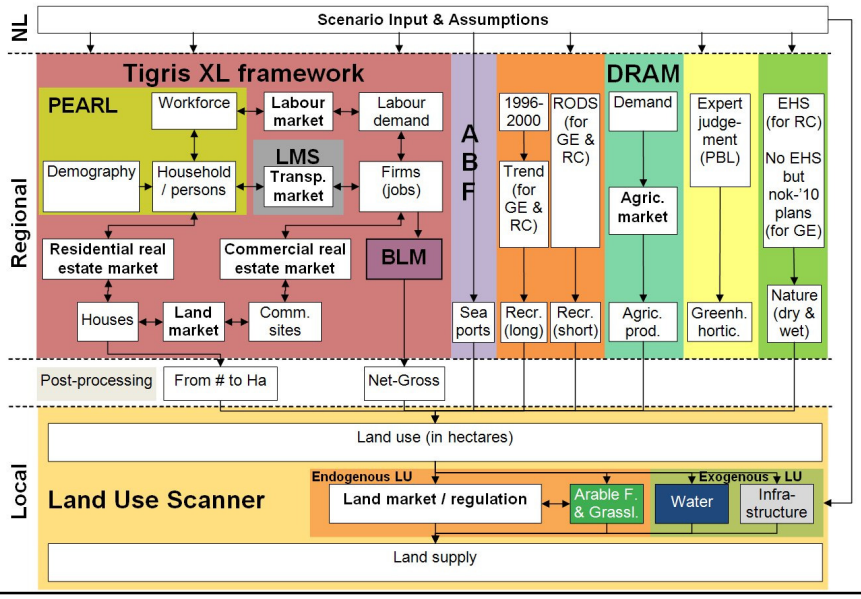
Integrating and downscaling national socio-economic scenarios

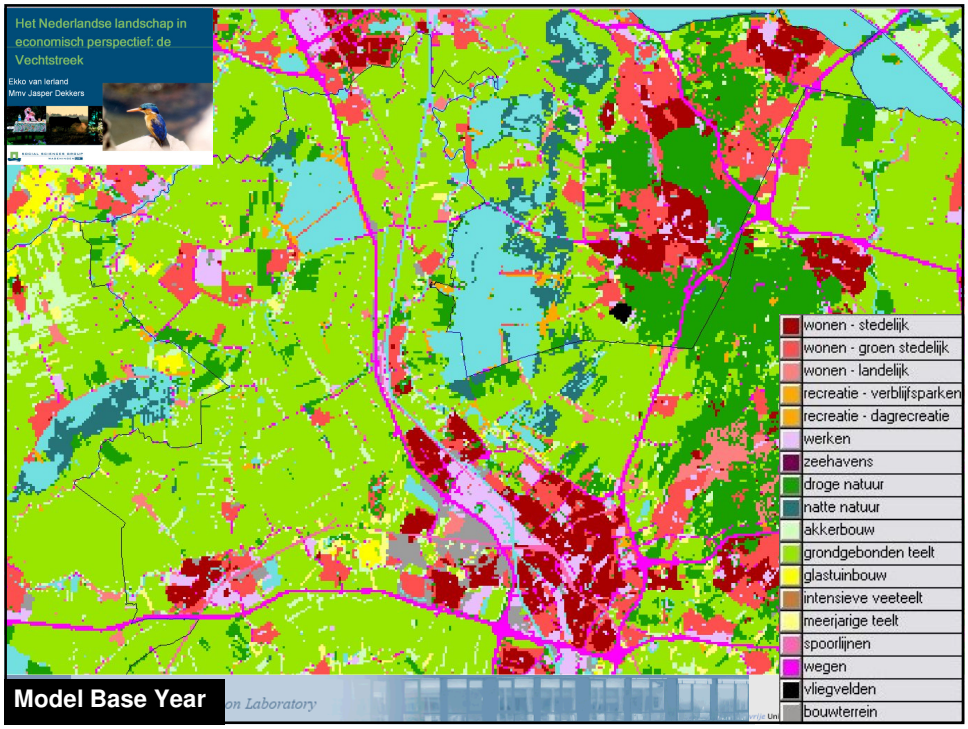
Eric Koomen, Peter Verburg and others
Vrije Universiteit Amsterdam

Research aims work package 1

1. Integrating sector-specific models in a land-use modeling framework
   - reviewing sector-specific models (Pearl, BLM etc.)
   - analyse influential factors (accessibility, land market)
   - revise modelling framework (with PBL)
   - integrating scenario-based regional projections for different sectors into coherent land-use simulations
2. Incorporating intensity and multi-functionality in a land-use model
   - analyse changes in urban density (e.g. intensification Haaglanden, shrink in peripheral regions)
   - economic valuation of landscape services
   - use agent-based model in participatory policy design for a multi-functional rural landscape

Revised modelling framework




Het Nederlandse landschap in economisch perspectief: de Vechtstreek
Ekko van Ierland
Mmv Jasper Dekkers
wonen - stedelijk
wonen - groen stedelijk
wonen - landelijk
recreatie - verblijfsparken
recreatie - dagrecreatie
werken
zeehavens
droge natuur
natte natuur
akkerbouw
grondgebonden teelt
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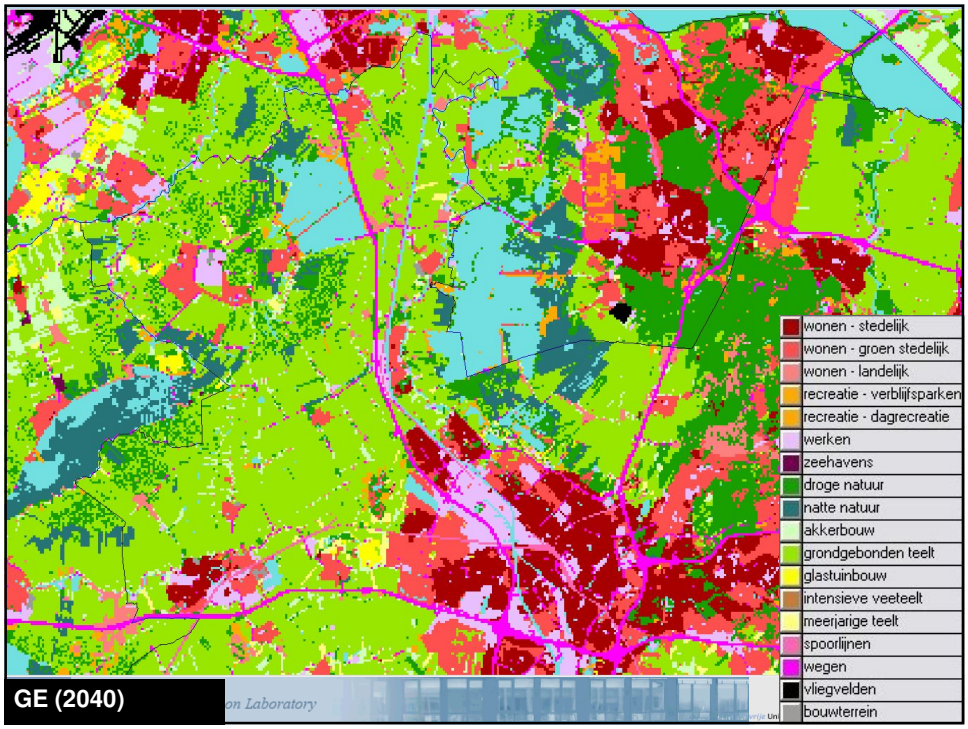
Model Base Year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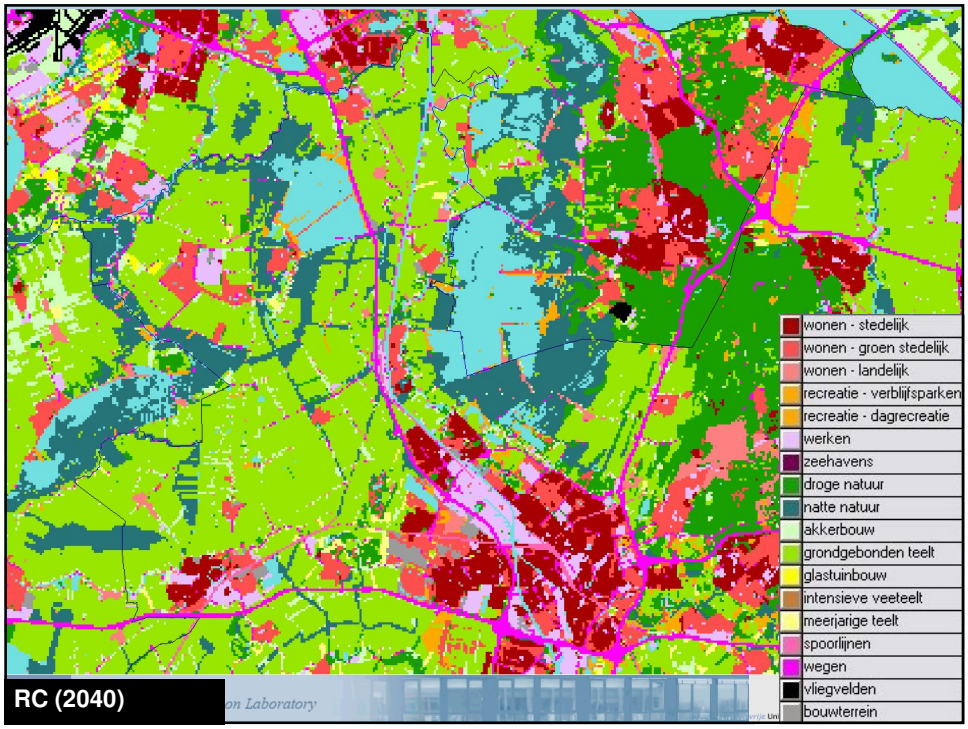
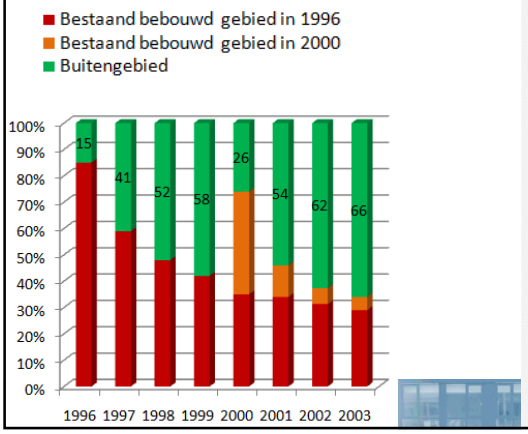
GE (2040)



RC (2040)

Analysing residential density change

- Share of net increase in new housing stock outside existing urban areas in the country




BB
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Bestuur en Organisatie | Financiën | Openbare orde en Veiligheid | Ruimte en Milieu | Sociaal | Digitaal Best
Nieuws | Opinie | Achtergrond | Agenda | Dossiers | Partners | Whitepapers | Events
Ruimte & Milieu > Nieuws > 'Randstad moet functies stapelen'

'RANDSTAD MOET FUNCTIES STAPELEN'

Carien Overdijk • 26 apr 2011 • 2 reacties

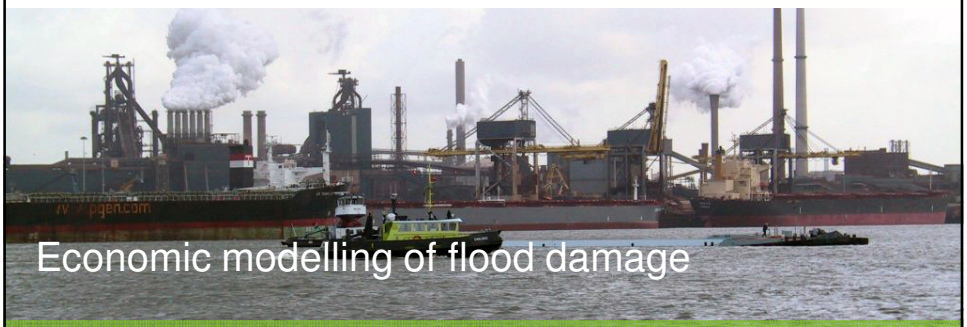
Nederland staat op een planologisch omslagpunt. De context van ruimte- en vervoersvraagstukken is sterk veranderd door de klimaatcrisis, internationale concurrentie en toenemende concentratie van de bevolking in de Randstad. 'Functiestapeling' wordt belangrijker.

Dit werd dinsdag duidelijk op de Ruimteconferentie van het Planbureau voor de Leefomgeving. Op de conferentie, bezocht door ruim vierhonderd rijks- en provincieambtenaren, ruimtelijke adviseurs en wetenschappers, waren gemeenten, op Rotterdam na, nauwelijks vertegenwoordigd. Toch ging het vaak over de laagste bestuurslaag.

Enkele onderzoekers namen het binnenstedelijk bouwen onder de loep. Zij concluderen dat de landelijke streefwaarde van 40 procent in de Randstad niet wordt gehaald, terwijl de streefcijfers van bijvoorbeeld Amsterdam, Haaglanden en Utrecht ver daarboven liggen.

Hoewel de onderzoekers het bestuurlijke draagvlak voor verdere verdichting in de Randstad hoog noemen, wijkt de praktijk sterk af van het beleid. Jasper Dekkers (VU Amsterdam) noemt dit de 'verdichtingsparadox'. Hij vond in Haaglanden (streefcijfer 80 procent binnenstedelijk) tussen 1998 en 2008 een verdichting van slechts 20 procent. 'Dat komt deels doordat Den Haag veel oude panden heeft gesloopt en op die plekken lagere aantallen woningen heeft teruggebouwd. Haaglanden zal een flink tandje moeten bijzetten.' Ook elders maakt de Randstad de geambieerde verdichting niet waar, stelt Dekkers. 'Als het zo doorgaat gaan de groene bufferzones en de Nationale landschappen eraan.'

130 years VU UNIVERSITY AMSTERDAM



Economic modelling of flood damage

Development of a methodological framework for integration of Computable General Equilibrium(CGE) and multi-agent modelling approaches

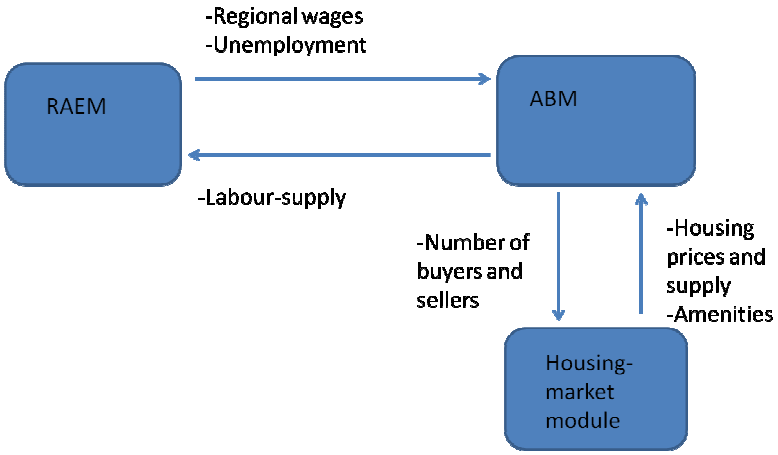
Trond Husby

IVM Institute for Environmental Studies

Research question and methodology

- Flood risk & household migration
- Risk = f(probability, exposure)
- Central because: circularity flood risk and migration
  - ↓probability(e.g. protection)→↑migration to flood-prone areas→↑exposure
  - ↑probability(e.g. climate change)→↑ ↓ migration ?
  - Heterogeneity among households important (e.g. flood as a sorting mechanism)
- Combine standard macroeconomic model with elements from multiagent modelling

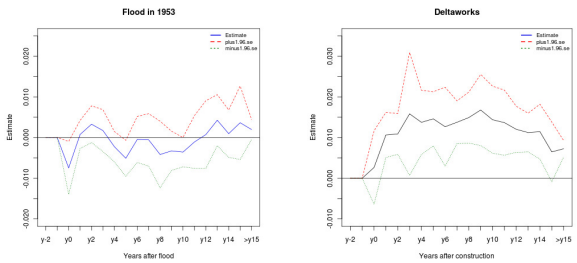
Modelling framework



Empirical analysis

- Research question: did the North Sea flood in 1953 have a long-term impact on population growth in affected areas?
- Main finding: the flood itself did not have long lasting effects, the Deltaworks did.
- This also implies an increase in exposure over time

$$Pop.growth_{m,t} = \sum_{k \geq 1} \beta_k Treatment_{m,t} + \sum_m \delta_m + \sum_t \alpha_t + u_{i,t}$$



Regression results showing the dynamic effects of the 1953-flood and the Deltaworks constructions. Here m refer to municipalities and t to year. The treatment-variable refers to either the flood in 1953 or the construction of the Deltaworks. k refers to time-periods in which the treatment was in place. The model in the left-panel included Deltaworks as control-variables.

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Interactive spatial tools to support the development of regional adaptation strategies

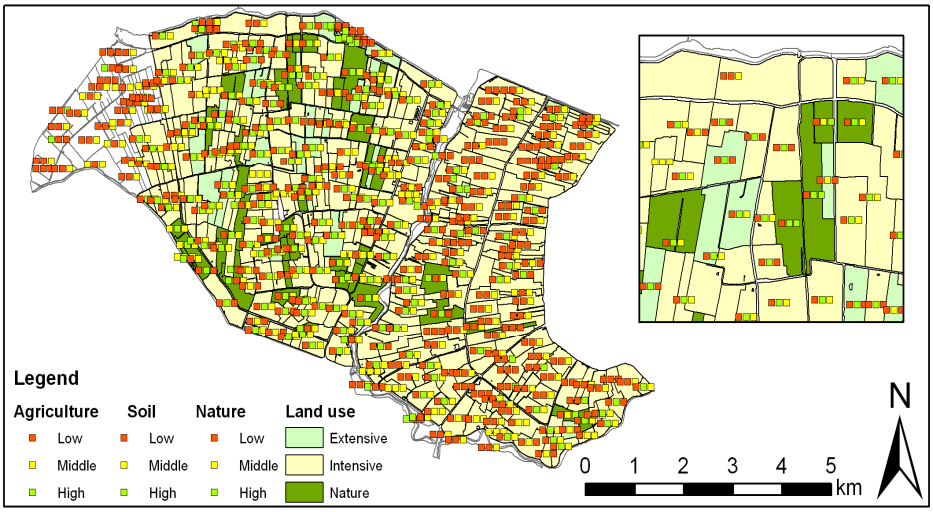
Tessa Eikelboom, Ron Janssen WP3

Research question

How effective are map based decision support tools for interactive design of special adaptation strategies.

- Analysis of the planning process and design of workshops
- Development of tools
- Set up experiments to test the tools.
- Integrate tools into a workshop design.
- Set up experiments to test the design.
- Test the scripts on the case studies.

Evaluation tool
Provide values for three objectives for all parcels



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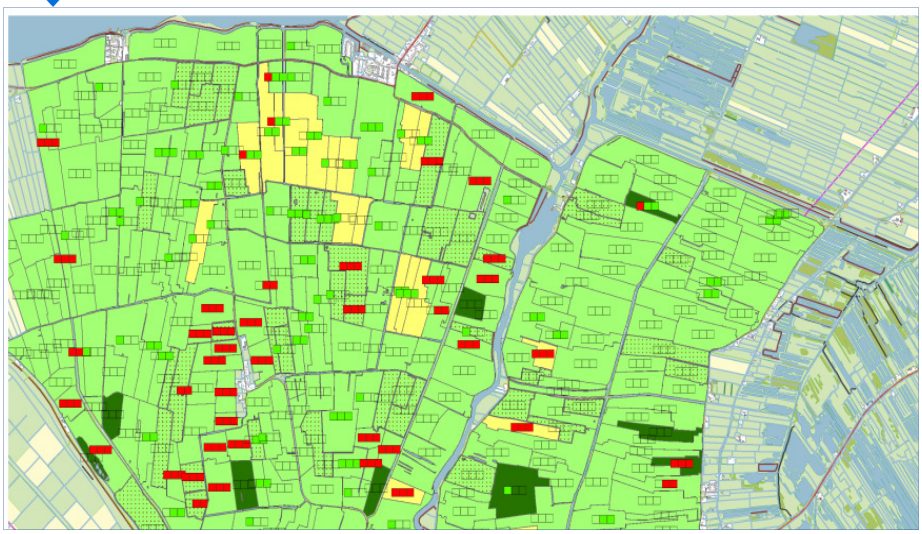
Negotiation tool:
finding high-low combinations for land use change



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Results

Tools were tested in three interactive workshops:

- Drawing tools: Salt intrusion on “Texel”
- Simulation tool: Water management in “Zevenblokken”
- Evaluation tool: Adaptation alternatives south of the Tjeukemeer.

Negotiation tools were tested in two experimental workshops:

- Workshop 1: Researchers
- Workshop 2: Planners and decision makers

Results and recommendations from these workshops will be used to support regional adaptation strategies as part of the regional plan for the Frisian fen meadows (Veenweide visie).

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Knowledge for Climate

Workpackage 4

Visualising complex climate information for spatial adaptation planning

Towards a guiding information visualisation framework

PhD STUDENT Monique de Groot MSc
PROMOTORS prof. dr. P. Vellinga and prof. dr. A.K. Bregt
CO-PROMOTORS dr. H. Goosen and dr. R.J.A. van Lammeren

Research question

"How can we improve visualisations in order to make given spatial information on climate change impacts more relevant for policy makers in the design phase of the adaptation planning process?"

Phase 0:
research proposal

Phase 1:
literature survey on framing, impact indicators and mapping techniques

Phase 2:
design of conceptual framework

Phase 3:
experimental set up and case study testing

Phase 4:
dissertation, defense and practical guidelines

Scientific output so far:

- ✓ Paper climate adaptation atlas
- ✓ Paper case study Zuidplaspolder
- ✓ Paper and oral presentation visualisation framework and guiding model

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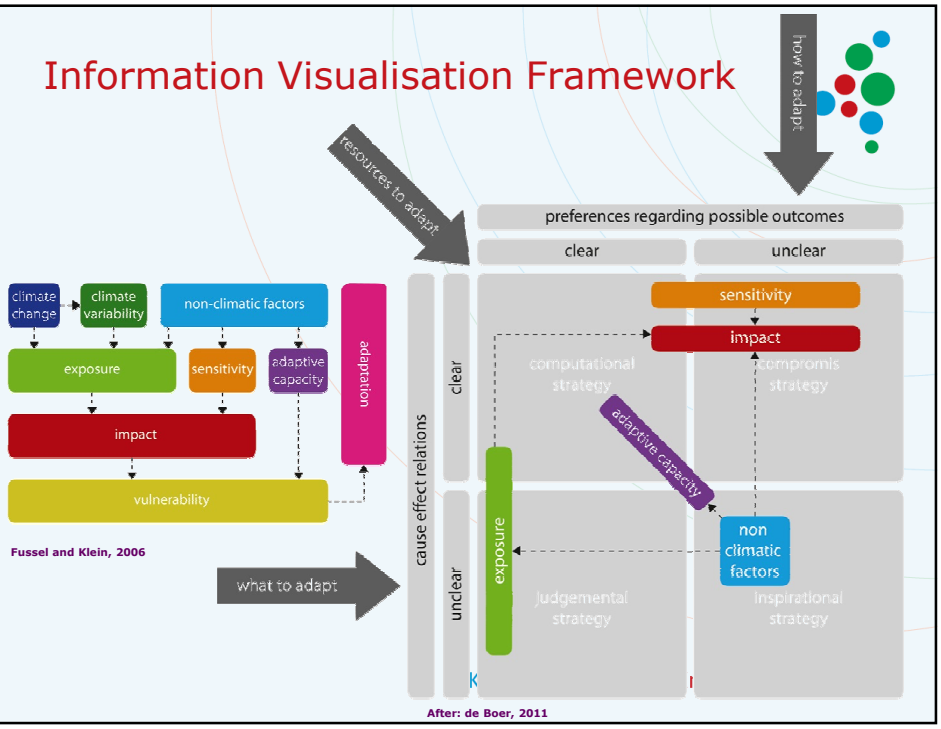
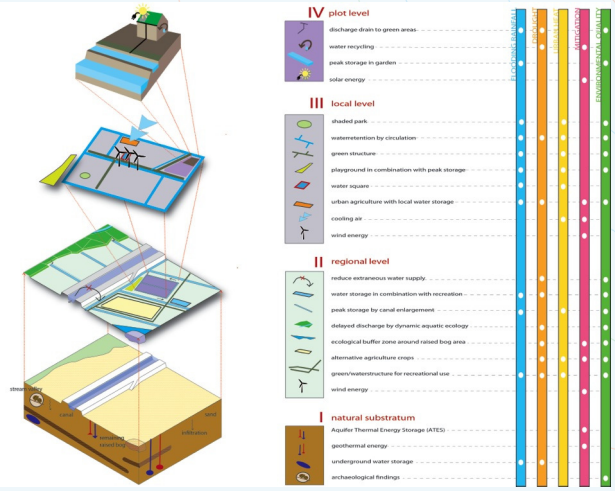
Information Visualisation Framework



Visualisation technique

Non climate factors



Guiding models

Used in 15 workshops with provinces, municipalities and water authorities

Evaluated by interviews and questionnaires

In cooperation with Delta program

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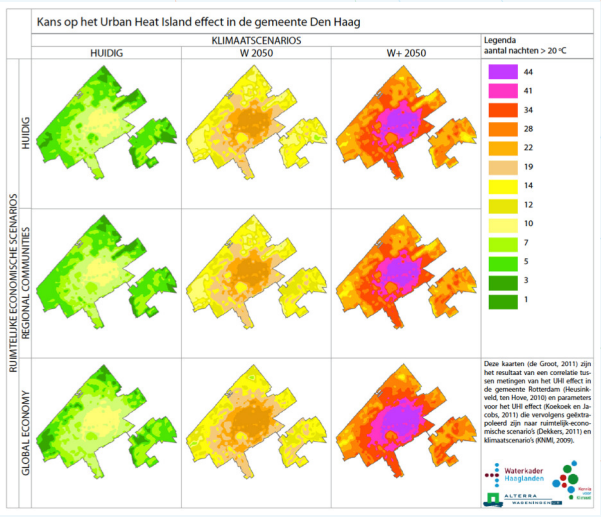
Visualisation technique

Exposure



Urban heat map

Used in Hotspot Haaglanden

Evaluated with voting buttons

In cooperation with Climate Proof Cities

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WP 5: Economic modeling of climate change and water scarcity

- Examines the economic impacts of increasing frequency of water scarcity due to climate change
- Models the impacts on the economy as a whole instead of existing partial, sectoral approaches of a reduction of for instance available irrigation water on the agricultural and related sectors
- For this purpose, an Applied General Equilibrium (AGE) model is used ('GTAP') to capture both the direct and indirect effects of water scarcity on economic sectors (agriculture, electricity, navigation, other industry) as the economy (re)adjusts to changing external circumstances

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Two ways to model water scarcity: focus on the direct and indirect effects

General Equilibrium method focuses on economic feedbacks.

It has a low level of detail regarding crop dependency on water

Direct Method focuses on the details of the crops dependency on water. It does not include economic feedbacks

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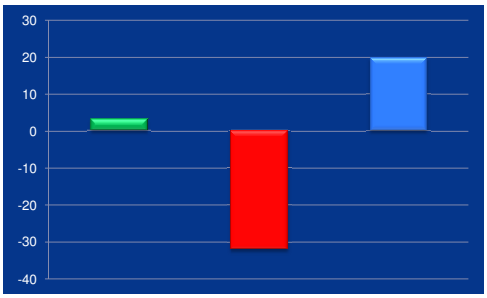
Preliminary results: welfare implications for the Dutch economy if the available irrigation water stock in NL is reduced by 15%

Millions of U.S. Dollars



The total impact on the Dutch economy is a 10 million dollar loss instead of a 32 million dollar loss which would result from a model only focusing on the direct effects.

Red is the direct effect = the value of the water removed from the agricultural sector
Green is the indirect effect of resource re-allocations within the Dutch economy.
Blue is the impact on the terms of trade in the open Dutch economy: Dutch exports become more expensive relative to imports. The vegetables and fruits sector for example benefits a great deal from the positive terms of trade as their export prices increase significantly.

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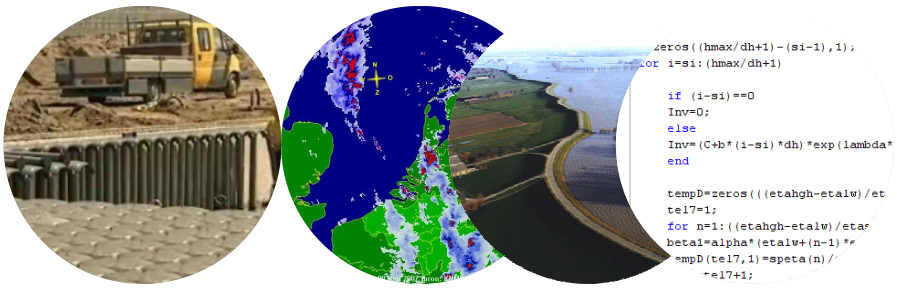
Optimal timing, cost benefit analysis and adaptation strategies

Work package 6

Promotor Ekko van Ierland; Co-promotor Hans-Peter Weikard; PhD student Thomas van der Pol

Environmental Economics and Natural Resources Group, Wageningen University



```
zeros((hmax/dh+1)-(si-1),1);
or i=si:(hmax/dh+1)

if (i-si)==0
Inv=0;
else
Inv=(C+b*(i-si)*dh)*exp(lambda*
end

tempD=zeros(((etahgh-etalw)/et
tel7=1;
for n=1:((etahgh-etalw)/etar
beta1=alpha*(etalw+(n-1)*
empD(tel7,1)=speta(n)/
tel7+1;
```

WAGENINGEN UR
For quality of life

Research questions

Paper 1 (in preparation)

- What is an economically efficient dike height?
  - ...Under an uncertain rate for the structural increase of the water level
  - ...and provided that we may learn about this rate?

Paper 2 (under construction)

- What is a cost-effective storage capacity of a water retention facility?
  - ...provided that at least 'a middle' climate change scenario must be anticipated
  - ...and future rainfall observations

WAGENINGEN UR
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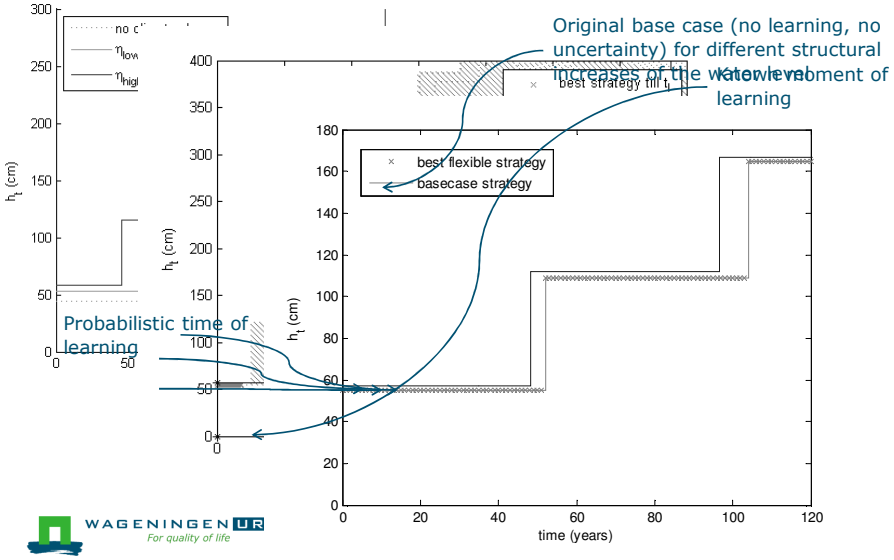
Optimal dike height



WAGENINGEN UR
For quality of life

Results

- The total value of (perfect) information is in the order of 1-2% of total expected costs.
- The original base case solution does not remain periodic under a probabilistic rate for the structural increase of the water level.
- Uncertainty in isolation increases dike heightening effort.
- In contrast, a non-zero probability of future learning tends to reduce dike heightening.

WAGENINGEN UR
For quality of life

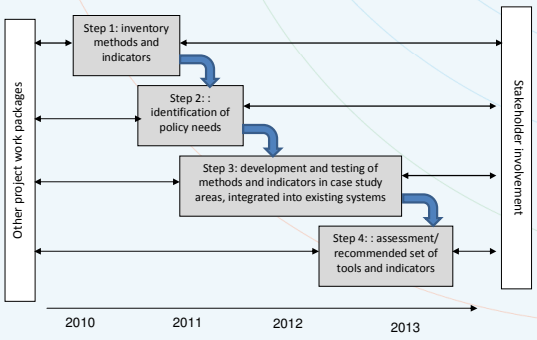
Kennis voor Klimaat
Knowledge for Climate

Monitoring, indicators and evaluation of adaptation

Theme 8 - Decision support tools
Work package 7 - Monitoring and evaluation
Kaj van de Sandt, Jelle van Minnen, Leendert van Bree, Nico Pieterse and Judith Klostermann

Main research question

- Which evaluation methods and associated indicators are available or can be developed to monitor and evaluate the implementation of adaptation measures and the climate-robustness of plans, programs and projects?



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Analyses of existing framework

We developed a general framework that should help governments and project leaders to set up a structured monitoring program

The framework consists of:
1. **Requirements for institutional body responsible for monitoring**
2. **Method for defining the system of interest**
3. **Method for selection of indicators**
4. **Monitoring and evaluation procedures**

We analysed if existing monitoring strategies or monitoring strategies under development follow this framework and what lessons we can learn

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Example of analysis result - monitoring Finland's Adaptation Strategy

Institutional body	Institutional body	Coordination group for Adaptation to Climate Change
	Dependency	Not independent - steered by the ministry of Agriculture and Forestry and involved in implementation
	Resources	Supported with resources
	Stakeholder involvement	Different stakeholders are member of the Coordination group and therefore committed to the results
System of Interest - Adaptation context	Climate system	In depth analyses based on downscaled scenarios for Finland in different research programs with different scenario assumptions
	Climate impact	In depth sectoral analyses. Sectors cover natural and social economic systems
	Vulnerabilities	No, impacts are described in terms of advantages and disadvantages
	Temporal scales	Clearly delineated scales: "immediate " (2005-2010), short term (2010-2030) and long term (2030-2080)
	Spatial scales	Unclearly delineated scales: mostly at national level but in some sectors more detailed (regional scale)
	Mainstreaming	Is seen as an important way to implement climate adaptation policies and measures. Mainstreaming means that climate change impacts should be incorporated into the regular planning, implementation and monitoring processes of the different sectors
	Adaptation action	Yes, identified for each sector and categorised along responsibility, anticipatory or reactive and timing
	Information needs	Defined, what progress has been made in adaptation for different sectors since the adoption of the NAS? The progress is measured on the following elements: • Recognition of the need for adaptation • Adaptation measures launched • Adaptation research • Cooperation between sectors

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Example of analysis for monitoring Finland's Adaptation Strategy 2

indicators	Planned adaptation	A part of the indicator "level of adaptation" indicates progress in adaptation measures taken
	Adaptive capacity	No explicit measurement of adaptive capacity, the indicator "level of adaptation" indicates part of the adaptive capacity by the criteria variety and learning.
	Mainstreaming	A part of the indicator "level of adaptation" indicates the level of mainstreaming by the criterion inclusion
	Outcome	No outcome based indicators used
Procedures	Data collection and reporting	Coordination group collected data by assessing adaptation measures themselves or with assistance from other experts. Representatives of funding agencies assessed the research efforts. It is not clear how conclusions were made about the cooperation between sectors and the recognition of the need of adaptation.
	Process	Not clear
	Adaptive monitoring	Not mentioned

Strong points: broad, systematic approach backed up with science; early start of monitoring.
Weak points: no insight in outcomes, doesn't use the concepts of vulnerability or adaptive capacity, limited insight in the social system, unclear procedures

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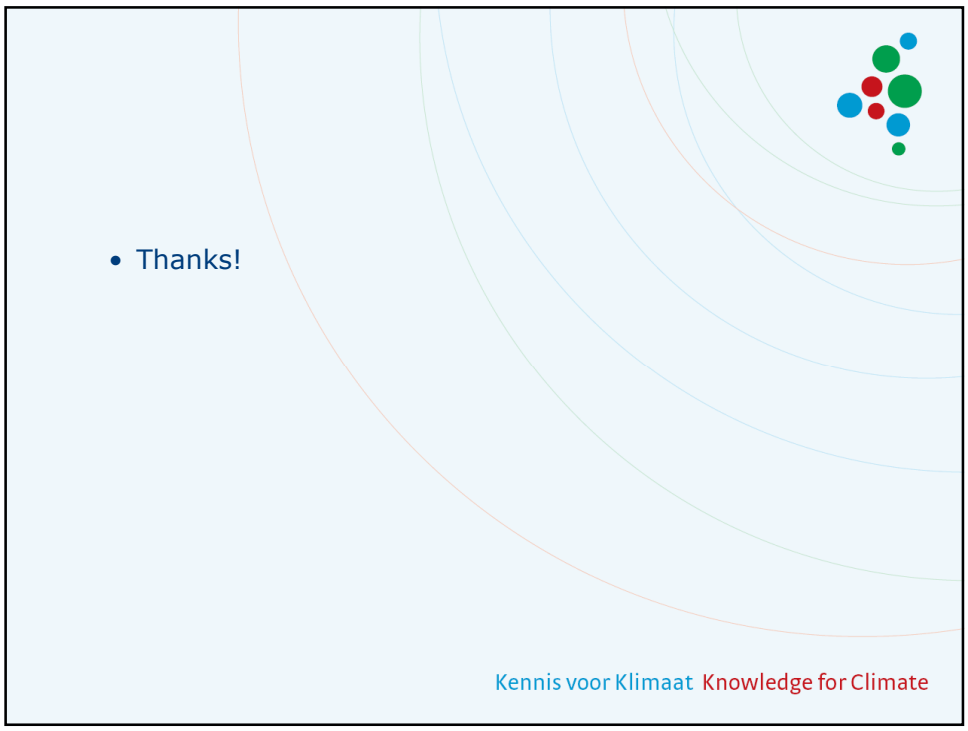
• Thanks!
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