Kennis voor Klimaat
Knowledge for Climate

Newsletter Decision Support Tools Theme 8

Issue 1, March 2011

Kick-off meeting Tuesday 19 October 2010

The official start of KvK theme 8, Tools for Adaptation, with the leaders and some PhD students of the 7 work packages was held in Wageningen on 19 October 2010. The participants introduced themselves briefly and described their role in the project. Several links with other themes already exist and should be developed by each individual WP. WP leaders and hotspots coordinators will meet 2-3 times a year.

The role of communication officer of theme 8 will be fulfilled by mrs Wil den Hartog, at Wageningen University.

Project day of KvK 7 April 2011

On April 7th 2011 the Knowledge for Climate program organises a Project Day to stimulate knowledge exchange and cooperation between the different hotspots and research themes of the programme. Everyone working within Knowledge for Climate is invited to attend. As the Project Day focuses on regional adaptation strategies the main language of the Project Day will be Dutch.

To welcome the young researcher into the programme, Knowledge for Climate offers PhD's and postdocs a chance to meet each other at the *PhD diner roulette* in the restaurant of Regardz Eenhoorn in Amersfoort. This dinner offers a chance to informally get to know the board of Knowledge for Climate and fellow PhD students. There will be a start off with some inspirational speeches and change seats after each course. During the dinner the conversation will be in English as there will be English speaking researchers attending.

PhD information

Within our theme there are seven PhD candidates appointed, and they started already working on their thesis.

Names: Derek van Berkel and Chris Jacobs (wp1), Trond Husby (wp 2), Tessa Eikelboom (wp3), Monique de Groot (wp4), Jason Levin Koopman (wp5) and Thomas van der Pol (wp6).

In the next newsletter we will highlight these candidates and their projects.

Steering Committee

The steering committee has been settled and the first meeting was organised on March 9, 2011.

Members: Peter Nijkamp (Vrije Universiteit - chair), Marten van der Gaag (IPO), Carl Paauwe (Haaglanden), Carl Koopmans (SEO), Henk Scholten (Vrije Universiteit), Harold van Waveren (I&M) and Marieke Soeters (I&M).

Kim van Nieuwaal will join the committee on behalf of Kennis voor Klimaat.

WP 1 Integrating and downscaling national socio-economic scenarios

Problem definition, aim and central questions

The development of effective regional climate adaptation perspectives not only requires information on climate change but also calls for the consideration of changing economic and societal conditions. Land-use models are suitable tools to downscale existing national scenarios into changes in local land-use patterns and thus provide the relevant context for the development and evaluation of climate mitigation and adaptation measures. The Land Use Scanner model was successfully applied in this context in the current CcSP and KfC programs.

These applications have, however, indicated two important drawbacks: 1) current regionalised sector-specific outlooks on the future based on national scenarios lack a thorough integration; and 2) the translation of sector-specific development (e.g. number of new residences) and spatial measures for climate adaptation into a related demand for space (in hectares) used in the land-use model lacks the accuracy and flexibility needed for climate-related impact assessments and the development of adaptation alternatives.

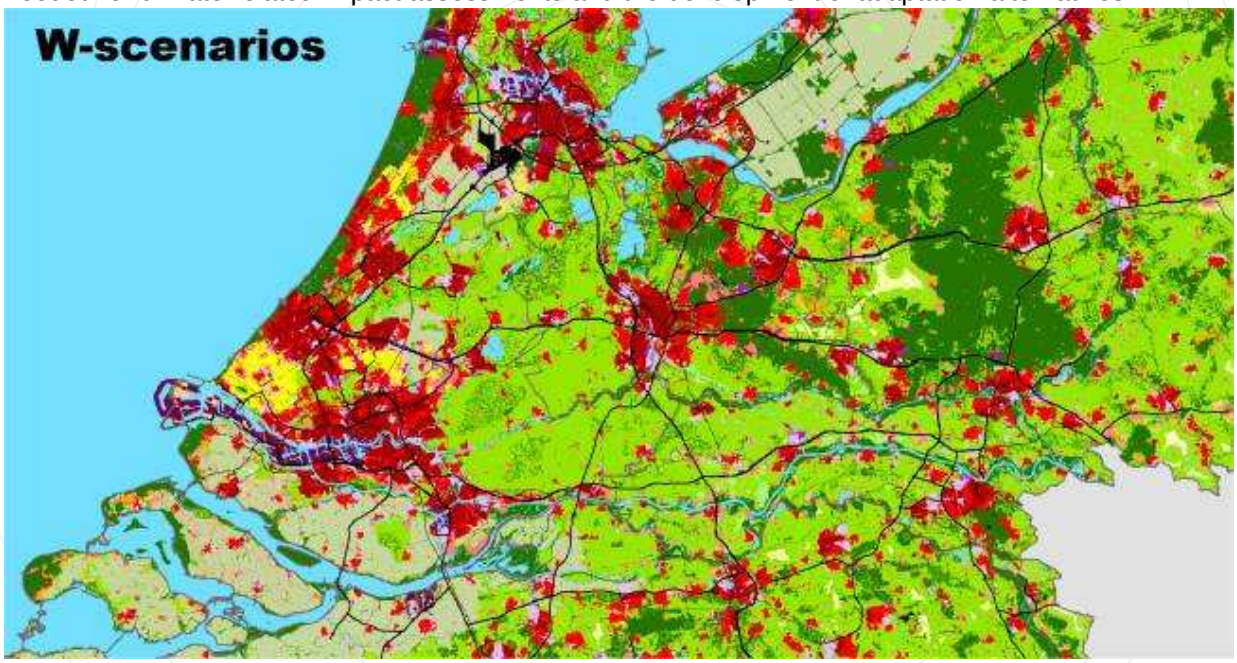


Figure 1 – Example of a scenario result image of future land use from the Land Use Scanner

This work package thus has the following objectives:

1. better align and integrate the sector-specific models for, amongst others, residential, commercial and agriculture development. This integrated approach will ensure a more robust link with the underlying scenario assumptions and allows for the incorporation of feedbacks between climate-induced and other developments in different economic sectors. This work will be performed in cooperation with the Netherlands Environmental Assessment Agency (PBL).
2. revise the model to allow the incorporation of functional units (e.g. residences, water storage quantity) rather than hectares. This enables a more flexible inclusion of issues such as land-use intensity and multifunctionality, allowing, for example, a more accurate assessment of flood risk and a wider scope of adaptation measures.

WP 2 Assessing the Economic Impacts of Flood Risks

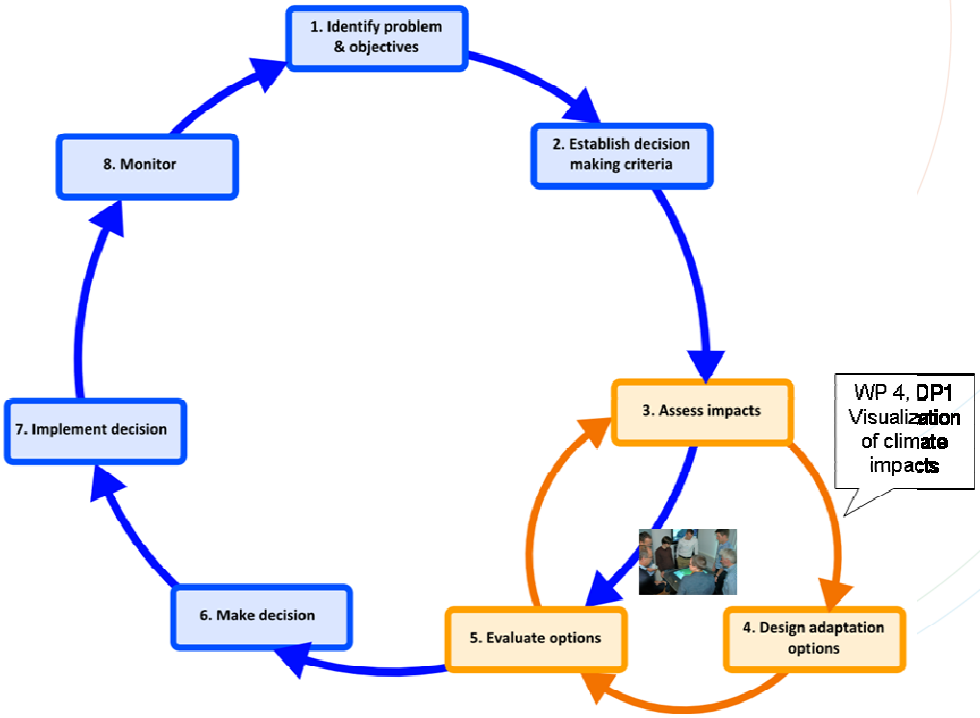
What are the indirect and long-term consequences of disastrous flood events? WP2 intends to construct economic models that will be employed to investigate how the effects of a flood ripple through the regional and national economies. Particular attention will be devoted to adaptation among firms and households that serve to dampen such effects over time. The modelling approach will combine an existing Computable General Equilibrium (CGE)-model with elements from agent-based modelling. The CGE-model in question – RAEM - is well suited to study how changes in factor and product prices affect different sectors across regions in the Netherlands. However, this model does not include an adequate level of detail to capture the complex mechanisms involved in the adaptation processes. Agent-based models, which focus on heterogeneity of agents and interaction between them, will therefore enhance the existing modelling framework. The project is carried out in co-operation between TNO Delft, and the Institute for Environmental Studies of VU Amsterdam.

WP 3 Interactive development of spatial adaptation strategies

An adaptation strategy is the combination of possible measures that can develop the current state towards a system that better copes with, manages or adjusts to changing conditions. This research is about the tools to support the development of adaptation strategies for spatial planning. With ongoing climate change where land-use changes play a central role, spatial adaptation strategies are even more important.
In practice, decision makers have difficulties in the development of adaptation strategies as multiple stakeholders with conflicting goals, objectives and perspectives are involved. In addition, the information that is needed to design adaptation strategies is detailed and complex. The interpretation of maps depends on multiple factors like the amount of information covered by the map, the level of detail, the scale, the visualization of the map and the knowledge of the map user.
Communication about spatial information should be in a more interactive manner as interactivity positively influences the design of spatial adaptation strategies. Interactivity provides stakeholders with the opportunity to interact with spatial information. Interaction with spatial information increases the understanding of underlying mechanisms. It also gives the user more influence on which data and in what form data is used. Interactivity can provide the user for instance with the possibility to change the scale, to compute effects of specific spatial changes or to make real-time changes to a map.
The goal of this workpackage is to develop tools that will support interaction between the decision makers and the spatial information. To evaluate the tools, a measure of effectiveness will be developed that includes different aspects of usability.

WP 4 Visualization of information on climate change

Adaptation planning involves a multitude of land use functions and affects a wide variety of stakeholders. Moreover, it requires dealing with a-typical aspects such as uncertainties and impacts that occur over the middle long term (>20 years) and long term (> 50 years). Therefore a cyclic iterative participative approach is needed. The role of the designer in the participative approach becomes more and more important for the integration between disciplines. The visualization project investigates how visualization of the a-typical aspects of climate change can improve the use of climate change information in design and planning process at the local/regional level. Figure 1 shows the domain of the research project in the decision cycle. The research builds on the Climate Adaptation Atlas through the development of new visualizations and analyses, tests and evaluates both new and existing visualizations. In order to communicate the key message the visualization of climate impact data needs to accurate as well as highly attractive and convincing. If the information is directed at the wider public, particular consideration should be given to limiting the complexity of information presented. The Figure belowshows an example of how geographic information can be abstracted into a symbolic representation in the form of icons. The goal is to measure the effectiveness of the different visualization techniques in different spatial planning and problem context. A literature survey will reveal available visualization techniques and a round of interviews with spatial planners involved with adaptation planning at the provincial level will identify information needs. Visualization tools will be developed and tested specifically for the Hotspots Haaglanden and Peat Meadows and Shallow Lakes.



WP 5 Economic modelling and assessment of the impacts of climate change and adaptation strategies of freshwater resources

The goal of this workpackage is to develop a framework to evaluate the efficiency, sustainability and equity of freshwater resource allocation. Although water is like other environmental goods and services used as an input for many profit making activities, the necessity of water for sustaining life makes it different from other renewable and non-renewable resources in that everyone has a right to cheap drinking and cooking water. This dual nature of fresh water coupled with the fact that ecosystem health also relies on clean fresh water, presents allocation of this limited resource with unique challenges.
The task of evaluating the efficiency and equity of an allocation scheme requires insight into the complex economic interrelationships between the users of fresh water. Similarly, evaluating the sustainability of an allocation scheme requires insight into the hydrological relationships between the different water sources and the ecosystem uses for freshwater, especially with respect to climate change and the uncertainty that it brings to the water supply.
Most models that examine these issues focus on the hydrological relationships and integrate economic concepts into the hydrological models. This project takes the opposite perspective and takes as its starting point an economic model and integrates hydrological complexities into the economic framework. In this way we can examine wide ranging economic consequences of a water allocation scheme while retaining realistic hydrological assumptions. We will pay particular attention to market based tools for water allocation under different climate scenarios. These tools will include water pricing based on the introduction of water markets.

WP 6 Cost benefit analysis and evaluation tools for adaptation options

Central aim of Workpackage 6

The project aims at developing detailed methods that can be applied in various case studies in a consistent manner, considering the future climatic change, based on the scenarios of KNMI and other meteorological offices. In close cooperation with the hotspots, it will be identified what type of assessment (CBA, MCA or qualitative methods) is required and what level of detail will be applied and what will be the relevant discount rates and CBA categories to be included in the analysis. We will focus on no regret options and precautionary measures and develop a clear set of guidelines on how to make assessments in a practical setting, based on the OEI framework for CBA but extended to cover issues that are particularly relevant for climate adaptation, such as irreversibilities and reservations for future actions. Special attention will be given to resilience and robustness, with linkages to PhD projects envisaged by Deltares in KvK Themes 1 and 2. The project will particularly be linked to the hotspot Haaglanden and will contribute in close cooperation with the stakeholders to the development of the regional adaptation strategy for Haaglanden.

Research questions

How can optimal timing of adaptation measures be determined in a setting of decision making under uncertainty and what are the implications for developing an adaptation strategy for climate change at the regional level?

Methods

The work package will specifically focus on the optimal timing of adaptation options and discounting of costs and benefits of adaptation under uncertainty, in a setting where overtime more information is becoming available on the expected climate impacts and on the best options to adapt. This calls for flexible systems that allow for adjustment in later years. This flexibility however, often comes at a cost and these costs need to be balanced with the uncertain benefits that are provided by choosing a flexible strategy.
In the project we will elaborate the theoretical framework, based the real option theory (cf. Pindyck (1994)) and we will apply the framework in a set of cases related to hotspot Haaglanden, where the costs and benefit structure will be analyzed in detail.
An important topic in this respect is flooding as a results of excessive precipitation in a setting where insufficient storage capacity is available because of the very intensive land use in the western part of the Netherlands. Because of the greenhouses of horticulture insufficient drainage is occurring and regularly flooding of greenhouses with high damages to agricultural production occur. Climatic change is expected to intensify this tendency and adaption measures for water storage and additional removal of excess water are required. This involves investment and one of the issues is the optimal size of these investments and the timing of the actual implementation of the investment programme, and the adjustement of the programme if new information on the impacts of climatic change becomes available.

A specific issue in the project will be how to deal with ancillary benefits that often have public good characteristics, such as benefits related to nature conservation and biodiversity. In traditional CBA these elements are often covered by pro memoria (pm) entries, which do not provide any information on the scarcity or the economic values involved. The work will be carried out at the Environmental Economics and Natural Resources Group of Wageningen University.

WP 7 Monitoring and indicators

Now we have an adaptation strategy, how do we evaluate its implementation?
The Dutch National Adaptation Strategy "Making Space for Climate" was published in 2007. In 2010 a Delta Programme was established to ensure water safety. These strategies and programmes are still rather abstract. Limited attention was as yet paid to the question of how to implement the strategies (e.g., policies and instruments) and how to monitor and evaluate progress. In the work package "Monitoring and evaluation of climate change impacts, vulnerability and adaptation policies at different spatial scales" this gap is filled. Evaluation mechanisms and indicators are required to evaluate if a plan, program or project is climate proof, and if so, until when. Such evaluation methods and indicators could be integrated into existing tools, like Strategic Environmental Assessments (SEAs, PlanMERs), Environmental Impact Assessments (EIAs, MERs), the Water Test, or new tools like climate guidance ("Klimaatwijzer").

The following research questions will be addressed:

- 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?
- How does the choice of methods and indicators depend on the scale of application, on time, and on the specific policy objectives?
- What is a coherent framework to structure evaluation methods and indicators in the broader context of sustainability?
- How can monitoring and evaluation methods and indicators of climate change adaptation and climate resilience best be integrated into existing monitoring programs?
- How can indicators be communicated and visualized, taking into account uncertainties?

The work will be carried out in close collaboration with other work packages and the hotpots they focus on, notably the further development and visualization of indicators in the Climate Effect Atlas. The participation of the project team in various related European projects ensures that lessons learned from other countries will be taken into account. Not to exclude options at the start of the project, the choice of tools and indicators for further elaboration will be made in consultation with national and regional stakeholders, with an emphasis on water management and spatial planning.

Kennis voor Klimaat

Knowledge for Climate

Contact information

Projectleader Theme 8

Prof.dr. E.C. van Ierland
Environmental Economics and
Natural Resources
Wageningen University
P.O. Box 8130
6700 EW Wageningen
The Netherlands
T +31 317 484307
E ekko.vanierland@wur.nl
W www.enr.wur.nl

Programme Office Knowledge for Climate

Secretariat:
c/o University of Utrecht
P.O. Box 80115
3508 TC Utrecht
The Netherlands

T +31 30 253 2470
E office@kennisvoorklimaat.nl
W www.knowledgeforclimate.org

The research programme Knowledge for Climate is co-financed by the Ministry of Infrastructure and the Environment.

Composition newsletter: Wil den Hartog (wil.denhartog@wur.nl)