



**climate** changes ssbueq3 **spatial planning**

International Conference  
Climate *changes* Spatial Planning  
(CcSP)

Conference Report

September 12 – 13, 2007  
World Forum Convention Center  
Den Haag, the Netherlands





# International Conference

## Climate *changes* Spatial Planning (CcSP)

Conference report



September 12 – 13, 2007

Venue: World Forum Convention Center,  
The Hague, the Netherlands

[www.climatechangesspatialplanning.nl](http://www.climatechangesspatialplanning.nl)





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## Foreword

Climate change is a reality. The latest report of the Intergovernmental Panel on Climate Change has provided a mount of new and convincing evidence that human influence on climate is undeniable and should be regarded as a factor of major importance. We recognize remaining uncertainties and gaps in our understanding of the functioning of the climate system – now and in the future. But even then, the basic understanding about the influence of human activities such as fossil fuel combustion and land use changes on our climate is well established and can hardly be disputed. Climate change does not only mean a long term gradual change of global mean temperature or precipitation fields. In fact climate change seems to be occurring faster than climate researchers expected some years ago. In response to these developments, the climate science community and policy makers are currently converging at a concept of combining mitigation efforts with climate adaptation measures and strategies.

In 2004, a unique and ambitious research programme started in the Netherlands, called '**Climate changes Spatial Planning**'. A budget of 80 million Euro has been made available, jointly by government and stakeholders on a 50/50 basis. The programme is implemented by a consortium of internationally recognized Netherlands scientific institutions, together with more than 50 public and private stakeholders. It includes basic research to improve climate models and climate scenarios, as well as strategies for adaptation and land use related mitigation.

Many disciplines cooperate in multidisciplinary projects, as well as in disciplinary, integrative projects. CcSP introduced the concept of 'climate proofing'<sup>1</sup> and it has successfully triggered a nation-wide debate on climate adaptation. This debate has led to the development of a national policy plan on climate adaptation and additional funding for a more design oriented research programme on adaptation and planning, to start in 2008.

Worldwide, the climate change debate has accelerated over the last 12 months, after the release of the latest IPCC report, and by attention drawn to climate change by the activities of Al Gore, Stern and others. In this setting we may conclude that CcSP is very timely, as we are ready to present our first empirical results at this international conference. The Research Programme has created many bridges between a range of research institutes and a wide variety of stakeholders.

The two day conference was held on September 12 – 13, 2007 in The Hague, the Netherlands. This conference contributed to the current European and international science and policy debate on adaptation to climate change and draws the intermediate balance sheet of the CcSP Programme.

The conference started on September 12 with plenary presentations and discussions by leading international climate experts, policy makers, and principal scientists from the Programme and by selected representatives of the stakeholders.

On the second day of the conference, project leaders and project consortia presented their interim results. An extended poster session was organised during both days, where specific issues of the projects were further highlighted, including the work in progress of more than 50 PhD students and a range of communication projects. Additionally there was an audio-visual presentation area and a mini-market of related national spatial planning research programmes and initiatives.

The conference was well attended with over 250 participants from the international science and policy communities and the private sector on both days.



This report gives a summary of the conference sessions and an overview of the poster presentations.

All presentations and posters can be downloaded from  
[www.klimaatvooruimte.nl](http://www.klimaatvooruimte.nl) or [www.climatechangesspatialplanning.nl](http://www.climatechangesspatialplanning.nl)

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<sup>1</sup> Kabat P, P. Vellinga, W. Van Vierssen, J. Veraart and J. Aerts, 2005. Climate proofing of the Netherlands. Nature 438: 283-284.



## Contents

Foreword .....	4
Introduction .....	6
Wednesday September 12, 2007 .....	7
Session 1: Opening .....	7
Session 2: Dutch research and policy dimension .....	7
Session 3: State of the art in climate research and policy domain .....	8
Session 4: State of the Art in climate research and policy domain .....	10
Thursday September 13, 2007 .....	12
Session 1: Plenary opening .....	12
Parallel Workshops .....	13
Session 1A: Climate scenarios: climate processes .....	13
Session 1B: Adaptation and Mitigation In Rural Areas: Bio-Energy and Agriculture .....	14
Session 1C: Adaptation to climate change: water management .....	14
Session 1D: Integration: participatory methods .....	15
Session 1E: Communication: Data portal and climate education projects .....	17
Session 2A: Climate scenarios: processes and tailoring .....	18
Session 2B: Land use and GHG balance: measuring and monitoring greenhouse gases .....	19
Session 2C: Adaptation: nature and biodiversity conservation .....	20
Session 2D: Integration: integrated assessment .....	21
Session 2E: Communication: reaching the stakeholders .....	23
Session 3A: Climate scenarios: model studies .....	24
Session 3B: Land use & mitigation: peatlands, climate and planning .....	24
Session 3C: Adaptation: sectoral aspects and regional approaches in 'hotspots' .....	25
Session 3D: Integration: socio-economic research .....	26
Session 3E: Communication: reaching a broader spectrum of professional and policy making stakeholders .....	28
Closure .....	30
Poster presentations .....	31



## Introduction

The Climate *changes* Spatial Planning Conference took place in the World Conference Centre in The Hague on 12 and 13 September and attracted more than 400 visitors from the Netherlands and around the world.

The conference was opened by Mrs Gerda Verburg, Minister of Agriculture, Nature and Food Quality, representing the Government. In her speech she concentrated on the effects of climate change on agricultural production and biodiversity. Given the expected heavy additional costs of the effects of climate change, cooperation within the EU, and with less developed countries too, will become all the more important. Martin Parry, vice-chair of the IPCC, also spoke about the effects of climate change on developing countries. Research indicates that dry regions will become drier and wetter regions even wetter, while the impacts of climate change are already becoming visible. Panel discussions were held with stakeholders at the end of each session.

The second day was opened by Jacqueline Cramer, Minister of Housing, Spatial Planning and the Environment. She talked about making the Netherlands climate-proof, in which spatial planning has an important contribution to make, and stressed that this is not just about flood control and water management. Climate change is not only a national problem, but is also high on the international agenda. The spatial aspects are being tackled on four fronts: the national adaptation strategy (ARK: Dutch national programme Adapting Spatial Planning to Climate Change) has just been adopted, a checklist is being drawn up for climate-proof spatial planning, washlands and retarding basins are being identified and made suitable for multiple uses, and flagship projects are being developed to promote awareness and pump-prime climate-proof investment. In addition, the new knowledge for climate programme (*'Kennis voor Klimaat'*) will start in 2008, with a budget of fifty million euros.

As part of the mid-term review process, the afternoon of the second day was taken up by parallel workshops on all the research themes of the Climate *changes* Spatial Planning Programme. The Scientific and Social Assessment Committees also attended these sessions and brought themselves up to date on progress with these projects and the initial results.



Wednesday September 12, 2007

## Session 1: Opening

Chair: prof.dr. Pier Vellinga, Chair of the Board Foundation CcSP, Wageningen University and Research Centre, Vrije Universiteit, the Netherlands

### Presentations

- Welcome and opening address on behalf of the Dutch Cabinet, Minister Gerda Verburg, the Netherlands, Dutch Ministry of Agriculture, Nature and Food Quality
  - EU climate research agenda and its relevance for adaptation policies, Dr. Elisabeth Lipiatou, Belgium, European Commission, Directorate General Research
  - Climate challenge: IPCC 4<sup>th</sup> assessment report and beyond, Prof. Martin Parry, Vice Chair Intergovernmental Panel on Climate Change, IPCC; Prof.dr. Guy Brasseur, National Centre for Atmospheric Research, NCAR, Boulder, USA, Lead Author IPCC Assessment Report 4
  - Climate and sustainable development, Dr. Carlos Nobre, Brazil, Chair Scientific Committee of the International Biosphere -Geosphere Programme, IGBP, Member of the Third World Academy
- Discussion moderated by Roger Harrabin, BBC environmental correspondent.

## Session 2: Dutch research and policy dimension

Chair: prof.dr. Wim van Vierssen, Vice Chair of the board Foundation CcSP, Director KIWA Research, the Netherlands

### Presentations

- Climate changes Spatial Planning: CcSP research highlights and key results, Prof.dr. Pavel Kabat, Wageningen University and Research Centre, CcSP Science Director and Chair of the Programme Council, the Netherlands
- Netherlands climate adaptation strategy: research to policy interaction, Pieter Bloemen, Dutch Ministry of Housing, Spatial Planning and Environment, the Netherlands



### Opening by the government

Minister Verburg opened the conference on behalf of the Dutch Government. She stated that Climate change has become an unavoidable matter and a top priority on the political agenda, supported by the latest outcomes from IPCC. The minister named both climate related risks and opportunities (beneficial measures) for agriculture, nature conservation and water management. The minister stated that climate change can also have some unpleasant surprises, she gave the example of bluetongue, which appears to be spread by small midges, which used to be prevalent only in warmer countries. Mitigating-measures will give industry, agriculture and transport new ways to develop in a

sustainable way. The Netherlands has announced its commitment to reduce emissions by thirty percent in 2020, for this purpose the Government has set up a project called 'cleaner and more efficient'. However, even the most far-reaching measures to curb emissions will not be enough to turn the tide. The Netherlands should become resistant to the effects of a changing climate in the 21st century, as described in the national Climate Adaptation Programme for Spatial Planning (ARK). She said also that the attention for climate -change here in the Netherlands must not divert our attention from the needs of the developing world, in particular in Sub-Saharan Africa and the mega-deltas of Asia. Cooperation and dialogue between providers of knowledge and policy makers has become inevitable, and she challenged the scientific society to provide politicians with tailored information to support this decision.

### International state-of-art science

The latest conclusions from IPCC (Fourth Assessment Report, 2007) were presented by Guy Brasseur (Working Group I) and Martin Parry (Working Group II). Elisabeth Lipiatou from the European Commission presented the European research agenda and explained how research in the European Union could support post-Kyoto policies and the European Adaptation Agenda (Green paper) in the context of the maximum 2° temperature rise target from the EU. Parry emphasised that currently in all continents of the world effects of climate change are detected. Net global economic damages are very unclear. He stated that the nearterm



benefits reported in IPCC Third Assessment (2001) are questionable, in particular for agriculture. Projected changes in temperature are broadly as projected in 2001, but uncertainty range is greater and upper end is higher. Carlos Nobre placed climate change impacts and policies in the context of sustainability. He showed



that the contribution of China, India and Brazil to the global CO<sub>2</sub> emissions is rapidly rising, however, the contribution per capita is still small compared to Europe and USA. Deforestation is also a major source of CO<sub>2</sub> emissions (18%), furthermore land use change (deforestation) results in shifts in the state of the ecosystem (from forest to savanna) and the regional climate (changes in precipitation patterns). He questioned the sustainability of biomass as a resource for renewable energy. For example, reforestation sequesters more CO<sub>2</sub> from the atmosphere compared to cultivation of energy crops, such as sugar cane used for ethanol production. The challenge is to value ecosystem

services. Carbon pricing might help to select sustainable development pathways. It is also clear that the poor countries will be hit the most by climate change. Nobre stated that payment for ecosystem services should provide LDCs with 10 billion dollars needed annually to face adaptation.

### Reflections by Roger Harrabin (BBC) on the morning session

Roger Harrabin noticed that the minister asks for certainty from the scientists and then she left in a rush, probably the usual attitude from policy makers. He questions the sustainability of energy crop cultivation for energy supply and agrees with the observations of Carlos Nobre. He doubts, like Martin Parry, the short-term increase of agricultural production due to climate change as reported by IPCC. He suggested that this formulation was changed by the IPCC under pressure from the US.

## Session 3: State of the art in climate research and policy domain

Chair: dr. Anton Beljaars, European Centre for Medium Range Weather Forecast, Reading, United Kingdom

### CLIMATE SCENARIOS

#### Presentations

- Global and European perspective: general progress and remaining uncertainties, Dr. Daniela Jacob, Max Planck Institute for Meteorology, Germany
- Regional perspective: regional climate scenarios and scenario tailoring, Prof.dr. Bart van den Hurk, Royal Netherlands Meteorological Institute (KNMI), the Netherlands

#### Panel

- Dr. Anton Beljaars, European Centre for Medium Range Weather Forecast, United Kingdom
- Dr. Toon Bullens, ACHMEA, the Netherlands
- Daan Dijk, Rabo Bank
- Gerard Doornbos, Waterboard of Rijnland, the Netherlands
- Prof.dr. Bart van den Hurk, Royal Netherlands Meteorological Institute, the Netherlands
- Dr. Daniela Jacob, Max Planck Institute for Meteorology, Germany
- Gary Rancourt, IBM, USA
- Dirk Symons, State advisor to the Dutch government on land use and planning, the Netherlands

#### Statements

1. Policy makers and investors do not like climate scenarios to be updated; they prefer the old version they have been working with before
2. Climate change is a manageable risk for insurance, investors and project developers
3. The Netherlands is safe until 2030 / 2050 given the latest climate scenarios and ongoing investments in water infrastructure, but not beyond

Dirk Symons stated that we have to deal with moving targets in the dark, policy makers should be aware of that. Bart van den Hurk sees it as an intellectual challenge to deal with 'moving climate scenarios in the dark'. Doornbos' opinion that we should stop discussing about uncertainties, but start to think about how to cope with climate change in water management. The current discussion in water management is focusing on flood risk and we seem to ignore the increasing risks of drought. Doornbos thinks that the Netherlands is able to adapt to climate change, however, other countries maybe not.





*The Netherlands is safe until 2030 / 2050 given the latest climate scenarios and ongoing investments in water infrastructure, but not beyond.* Daniela Jacob hopes that the first part of the statement is true but cannot give certainty about that, scientists do not make the decisions, and a big storm event might change this perception. Doornbos asks why we always look for preventions, we can also accept risks and weigh this against the costs of protection. Bart van den Hurk explains that the government is not the only one that is responsible for mitigating the risks, also the private sector and individual civilians have to take responsibility, he exemplifies this with buying a fast sports car.

## **ADAPTATION TO CLIMATE CHANGE**

### **Presentations**

- Climate adaptation: cross-sectoral approaches in relation to land use and spatial planning, Dr. Jeroen Aerts, IVM, Vrije Universiteit, the Netherlands
- Climate change impacts to California's water management and strategies for adaptation, Dr. Mark Roberson, Consulting Staff CALFED Bay-Delta Program, California, USA

### **Panel**

- Dr. Jeroen Aerts, Vrije Universiteit, the Netherlands
- Piet Dircke, Arcadis, the Netherlands and USA
- Mrs. Lenie Dwarshuis-Van de Beek, Province of Zuid-Holland
- Joop Krul, Director, Airport Development, Schiphol Group
- René Hoogendoorn, CEO AM Group, the Netherlands
- Johan Osinga, Director Strategy, Province of Overijssel, the Netherlands
- Dr. Mark Roberson, Consulting Staff CALFED Bay-Delta Program, USA

### **Statements**

4. It will take at least 25 years before scientific advice on adaptation is implemented in spatial planning and water management by the government, but the private sector is expected to be much faster
5. We are able to make the Netherlands climate proof, other world delta regions will follow
6. We leave the public with a too positive picture of adaptation as a ultimate response strategy to climate change

Jeroen Aerts of the Vrije Universiteit was confronted with his earlier statement that the Netherlands can uplift the Netherlands with million of tons of sand from the North Sea basement. The presenter was joking with him what neighbouring countries might do then; another conflict might happen?

The representatives of the provinces think they cooperate rather well with scientists with respect to the research on regional climate change. However, they ask questions for delivering concrete information to embed this in policy plans, for example with regard to salinity of land. Maybe these governmental organisations ask too much, but they cannot just wait and see what will happen. Some provinces see opportunities with regard to the coastal defence and innovations in water management, but all have to be aware of the threat of climate change.

The private sector wants to see business opportunities and to speed up innovations. Some companies handle climate changes as good news, and we have to consider our knowledge as a good Dutch export product. In the Netherlands we are dealing for hundreds of years with water management, so why can't we do that in the near future?

The aviation industry, mainly established in the Schiphol area, 6 meters below sea level, think they move faster with policy on mitigation and adaptation than the government does. For example, Royal Dutch Airlines has already implemented a climate business plan. But flying itself? Yes, the aviation might be the second largest contributor of CO<sub>2</sub> emissions in 2050.



## Session 4: State of the Art in climate research and policy domain

Chair: prof. Roger A. Pielke Sr., Colorado State University, Fort Collins, USA

### THE ROLE OF LAND USE IN MITIGATION STRATEGIES

#### Presentations

- European perspective, André Jol, European Environmental Agency, Copenhagen, Denmark
- Approaches towards integrated assessment and monitoring of land related GHG emissions, Dr. Ronald Hutjes, Wageningen University and Research Centre, the Netherlands

#### Panel

- André Jol, European Environmental Agency, Denmark
- Dr. Ronald Hutjes, Wageningen UR, the Netherlands
- Dr. Chris Kalden, Director, National Forest Service of the Netherlands
- Nico Landsman, Province of Zeeland, the Netherlands
- Dr. Bert Metz, Netherlands Environmental Assessment Agency, the Netherlands
- Prof. Roger A. Pielke Sr., Colorado State University, Fort Collins, USA
- Jaap Satter, Ministry of Agriculture, Nature and Food Quality, the Netherlands
- F. Luboyera, Representative of the UNFCCC Office Bonn, Germany

#### Statements

7. Land use bound emissions are still an underestimated emission source in the Netherlands and world wide while preparing post-Kyoto climate policies
8. Measures to reduce emissions from land use, such as raising groundwater tables, have significant additional socio-economic and ecological benefits (biodiversity), this adds new perspectives to mitigation related multifunctional land use
9. The national reporting activities to UNFCCC are highly uncertain. Currently employed reporting methodology cannot cope with the current uncertainties in land use related greenhouse gas emissions
10. The present share of bio-energy in the total Dutch energy production (2%) is one of the lowest in Europe. This share could grow to 17% of the national energy supply with our current knowledge

The first statement to discuss was if land use emissions are still an underestimated emission source in the Netherlands. André Jol thought that this was true but Bert Metz pointed out that land use emission related to deforestation is well known in the Netherlands and that only the emissions from agriculture needs to be investigated more. There was a small discussion about the significance of the role of albedo but the panel could not agree. The second statement was that measures to reduce emissions from land use will have significant additional socio-economic and ecological benefits. The panel agreed that measures would not necessarily generate positive effects. They also mentioned that subsidies for farmers and media attention can be very helpful tools in achieving the implementation of these measures. The next statement was that the national reporting activities to the UNFCCC cannot cope with the high uncertainty in land use related emissions. The panel did not really get into this statement. Festus Luboyera said that the uncertainty made it very complicated but that they have to use something. The last issue was about bio-energy, "a very hot topic" according to moderator Roger Harrabin: the share of bio-energy in the total Dutch energy production could grow from 2 to 17 percent with the current knowledge. André Jol thought that 17 percent appeared to be very high. We should not forget that the purpose of creating bio-energy is to decrease emission. The panel agreed. Bert Metz said that supply will not be the problem but the use will; there is currently not a high demand for bio-energy and rushing it, will not help climate change.

### ECONOMICS OF ADAPTING TO CLIMATE CHANGE

#### Presentations

- The economic costs avoiding climate change, dr. Terry Barker, Cambridge University and Cambridge Econometrics Ltd, United Kingdom
- Economics of climate adaptation: the Dutch experience and perspective, dr. George Gelauuff, CPB Netherlands Bureau for Economic Policy Analysis
- Integrated approaches to climate policies: Optimal combinations of mitigation and adaptation measures?, prof. Klaas van Egmond, Netherlands Environmental Assessment Agency, the Netherlands

#### Panel

- Dr. Terry Barker, Cambridge University and Cambridge Econometrics, Ltd, United Kingdom
- Dr. Frits Brouwer, Director General, Royal Netherlands Meteorological Institute, the Netherlands
- Daan Dijk, Rabo Bank, the Netherlands



- Gerard Doornbos, Waterboard of Rijnland, the Netherlands
- Prof. Klaas van Egmond, Director, Netherlands Environmental Assessment Agency, the Netherlands
- Dr. George Gelauff, Deputy Director, CPB Netherlands Bureau for Economic Policy Analysis, the Netherlands
- René Hoogendoorn, CEO AM Group, the Netherlands
- Prof. Leen Hordijk, Director International Institute for Applied Systems Analysis, Austria, Chair CcSP International Scientific Advisory Council
- Prof.dr. Pavel Kabat, Wageningen University and Research Centre, CcSP Science Director and Chair of the Programme Council, the Netherlands
- Dr. Elisabeth Lipiatou, European Commission, Directorate General Research, Belgium
- Dr. John Marks, Chief Executive European Science Foundation
- Prof. Jochem Marotzke, Director, Max Planck Institute for Meteorology, Germany
- Mrs. Annemieke Nijhof, Advisor to the Prime Minister, Ministry of General Affairs, the Netherlands
- Prof. Martin Parry, Vice Chair Intergovernmental Panel on Climate Change, IPCC
- Prof.dr. Pier Vellinga, Chair of the Board Foundation CcSP, Wageningen University and Research Centre, Vrije Universiteit, the Netherlands
- Nico de Vries, CEO Dutch Royal BAM Group, the Netherlands

### Statements

11. The Stern report has given a too high and unrealistic picture of the costs of climate change. In industrialised countries, like the Netherlands and the UK, the costs of adaptation should remain a fraction of the annual GDP
12. Dealing with climate change is learning to accept uncertainty in developing long investments
13. It is a waste of time to discuss climate change with citizens; governments should just start with the implementation of no-regret strategies
14. Climate change will generate immense opportunities for large-scale innovations. The climate issue will become a money making business
15. The climate change issue is perhaps the best illustration where a continuous science-policy-private sector dialogue is a prerequisite for successful coping strategies. This requires a new (inter)national scientific infrastructure
16. The media is creating a controversy regarding climate change

According to moderator Roger Harrabin, the largest panel he had ever seen appeared on the podium! The first issue to discuss was if the Stern report had made an exaggerated estimate of the costs of climate change. The panel did not agree with this: climate change is expected to be very expensive, as we seem to be on the high emissions path. The panel saw the exact measurement of these costs as unrealistic because we are talking about thousands of years. The next issue was if uncertainties must be accepted when decisions are made on long term investments. The panel agreed with this statement: every long term decision is subject to uncertainties, also those in railroads and other investments unrelated to climate change. There was some debate how important gut feeling is for decision making; some considered it decisive for political action, others preferred a proper scientific analysis. The next issue, debating with citizens was a waste of time, was a difficult one. Of course, no one heartily agreed, and green radicalism was not seen as a way forward. However, in the building industry the solution is not expected to come from citizens, as their demand for mitigation nor adaptation in new houses is low. On the other hand, where the Dutch government seems ready to act, this is not the case in many other countries in the world, and then citizens have to take the lead. In general, leadership was seen as an important factor by the panel: a strong personality can turn an unpopular issue into a possible choice. Is climate change a money maker? Yes, said the panel, if the government creates the right conditions: clear environmental standards, a feasible time table and some constancy in the governmental regime. The following question was if a new scientific infrastructure was necessary to help governments cope with climate change. The panel thought that much interaction between science and policy makers is already taking place. It is a process that takes time and is also expensive, which is often underestimated. The final statement was about the media: are they wrong in facilitating 50/50 exposure of climate sceptics and mainstream climate scientists? Everyone agreed to this, and the moderator was driven into the defence for a moment. He explained that the BBC is bombarded with claims by climate sceptics. This makes it hard for journalists to discern that 99% of the scientists in the field consider human-induced climate change a proven fact.





Thursday September 13, 2007

## Session 1: Plenary opening

Chair: prof.dr. Leen Hordijk, Director IIASA, Austria; Chair CcSP International Scientific Advisory Council

### Presentations

- Welcome and introductory addresses, prof.dr. Pier Vellinga, Chair Board Climate changes Spatial Planning programme
- Adaptation to climate change in spatial planning, Minister Jacqueline Cramer, the Netherlands, Dutch Ministry of Housing, Spatial Planning and Environment



- European climate adaptation strategy, dr. Fritz Holzwarth, Federal Ministry for the Environment, Nature and Nuclear Safety, Germany
- Reflections from the sector, dr. Chris Kalden, Director, National Forest Service of the Netherlands, Chair, Societal Evaluation Committee of the CcSP Programme
- Reflections on the role of land in understanding and responding to climate, prof. Roger A. Pielke Sr., Colorado State University, Fort Collins, USA
- Introduction to the parallel thematic workshops, Prof.dr. Pavel Kabat, Wageningen University and Research Centre, CcSP Science Director and Chair of the Programme Council, the Netherlands

The presentations can be downloaded from our website

[www.climatechangesspatialplanning.nl](http://www.climatechangesspatialplanning.nl)



## Parallel Workshops

### Session 1A: Climate scenarios: climate processes

Chair: prof.dr. Bart van den Hurk, Royal Netherlands Meteorological Institute

#### Presentations

Dr. Herman Russchenberg, Technical University Delft, The CESAR observatory: Climate monitoring and process studies (project CS2)

Dr. Harry ten Brink, Energy Research Centre of the Netherlands, The regional climate impacts of aerosols (project CS4)

Prof.dr. Reinder Feddes, Wageningen UR, Representation of soil moisture and root water uptake in a climate model (project CS3)

- Prof.dr. Reinder Feddes, Wageningen UR, Representation of soil moisture and root water uptake in a climate model (project

The radiation balance (at the surface), the soil water balance and models were presented: the Tessel model for the flow of water and heat and the SWOP model for the flow of water, heat and solutes. He explained the tests with the SWOP model via Tessel model, applied in Hungary and mentioning the effects on evapotranspiration. In future, the optimal TESSEL-Soil-Vegetation-Atmosphere Transfer scheme for implementation in RACMO2 (resolution 25 x 25 km) will be delivered to project CS6. The questions were about the accuracy of the observations (the team is convinced of correct data), its possibility to apply the data on global scale (possible, NASA had been investigated similar research at this scale) and how to calculate the soil parameters.

- Dr. Harry ten Brink, Energy Research Centre of the Netherlands, The regional climate impacts of aerosols  
The effects of aerosols on climate are important, but highly uncertain. Manmade aerosols have direct Radiative Forcing effects, and indirectly: influencing cloud. Cloud Albedo effect aerosols are the nuclei on which cloud droplets form. Clouds with more droplets reflect more solar radiation. Manmade aerosols serve as extra cloud nuclei and are thus indirectly cooling. This effect has the largest uncertainty. Modelling and dedicated new instruments were pointed out. The concentration of sulphate will drastically decline in the next decade(s) (question from the audience: Is that an experience? A: Yes it is, based on own observations and others), but ammonium nitrate is another local manmade aerosol-component and needs special instrumentation. This component seems to be an important ingredient of Cloud Condensation Nuclei, but must be verified in the ECN Cloud-Chamber apparatus. He stressed in his presentation the quality assurance within the research project. Another question was if improvement of parameterization for the Regional Climate Model (RCM) had been done for the Global CM? A: This is a continue process within RACMO. The emissions due to fossil fuels were highlighted in a programme for the coming years. Maybe the model can be implemented for this programme.

- Dr. Herman Russchenberg, Technical University Delft, The CESAR observatory: Climate monitoring and process studies

The CESAR Observatory: Climate monitoring and process studies. The overall objective of this project is to develop an essential infrastructure and measurement strategies for climate monitoring; to measure aerosols, clouds, radiation, land atmosphere exchange, precipitation and soil moisture in the context of climate and weather modelling, with the 213 metre high measuring mast at Cabauw, ground measurement equipment and remote sensing apparatus. The third objective is to contribute to the reduction of the uncertainty in climate change scenarios. Some sub-projects were pointed out: the Tower-based high resolution rainfall radar and the development of a Raman lidar (laser-radar) for the diurnal observation of clouds, aerosol and water vapor profiles and boundary layer structures. In his presentation he explained the effect of aerosols on diffuse sky radiation. Important results from this project are the combined cloud radar and Lidar data have been used to build a new type of ice cloud effective particle size parameterization, and the incorporation of the parameterization into a climate model radiation modules. Also, the recently installed drizzle radar measuring very low rainfall had been shown in the presentation. Besides, an example of radio links from cellular communication networks had been showed. In the discussion the relation between some other CS projects



was explained: data has been exchanged till so far, but not with respect of modelling. China is a good candidate for measuring purposes, due to the high network of masts and large television towers.

## Session 1B: Adaptation and Mitigation In Rural Areas: Bio-Energy and Agriculture

Chair: dr. Ronald Hutjes, Wageningen UR

### Presentations

Berien Elbersen, Wageningen UR, Biomass chain design and assessment tool (project ME4)

Dr. Tia Hermans, Wageningen UR, Impacts of climate and market changes on agriculture in Europe (project A12)

- Berien Elbersen, Wageningen UR, Biomass chain design and assessment tool

The overall objective of this project is to develop an integrated framework to assess and analyse the spatial implications and related opportunities and consequences of an increased implementation of biomass delivery chains for energy and materials at different geographical levels. In her presentation she explained the assessment tool with a demo. After the presentation there were some questions about how to use the model and who would be the end-users. It turned out that the demo showed an example for crops but the model can be used for any kind of biomass. The model can be used at any scale (small and large) but might not be suitable for other parts of Europe since it specifically focused on the Netherlands. The possible end-users are still being discussed as this also defines the output of the model. The builders will use the model together with the end-users. The province of Gelderland and the Suikerunie were both very interested in the model. The Suikerunie would however like to see more economics integrated in the model.

- Dr. Tia Hermans, Wageningen UR, Impacts of climate and market changes on agriculture in Europe

The main objective of this research is to develop strategies and action plans for agriculture in the Netherlands to adapt to both climate and market change, in the context of the EU and with the North of the Netherlands as a pilot region. They used two IPCC climate scenarios, A1 and B2, and three crops: wheat, milk and potatoes. In the presentation she focused on the wheat supply in scenario A1. The main conclusion for the Netherlands was that the competitiveness of wheat-production within the EU-27 countries will be small. During the discussion the questions also focused on the use of the model and its end users. There was a question on how she incorporated agricultural subsidies and milk quota in the model. The answer was that the model includes different scenarios for subsidies and quota, depending on which IPCC scenario is used. The end-users will be policymakers and farmers who need to make decisions for future investments. The definition study A12 will be followed up with two new projects: a scientific project (start mid 2008) and a hotspot case study NL North (start 2007). In the combined discussion the main question was if the competition of crops with biofuels was incorporated in project A12. This was not the case and the suggestion was made to do this together. Hermans and Elbersen said they will.

## Session 1C: Adaptation to climate change: water management

Chair: dr. Jeroen Aerts, Vrije Universiteit

### Presentations

Gert Becker, Vrije Universiteit, Developing adaptive capacity to extreme events in the Rhine basin (ACER) (project A7)

Laurens Bouwer, Vrije Universiteit, Financial arrangements for disaster losses under climate change (project A9)

Dr. Jeroen Aerts, Vrije Universiteit, Room for safety (new approaches to flood risk management under climate change) (project A13)

Dr. Mark Koetse, Vrije Universiteit, Consequences of climate change and weather conditions for the transport sector (project A8)

- Gert Becker, Vrije Universiteit, Developing adaptive capacity to extreme events in the Rhine basin (ACER)

The Rhine is a transboundary river catchment. The project is set up in: adaptive management, multiple scenarios, participatory approach. Hydrologic and socio-economic indicators for adaptation measures are assessed for different scenarios in dialogue with stakeholders. Extreme discharges (graphs with return times) will occur more often due to drought and floods. The influence of the seasons are more water in winter, less in summer (seasonal graphs). For example: high discharge in Lobith in 1993 (measured) compared with model results with adaptation measures (also taken in Germany), shows the efficiency of the catchment based approach. It is efficient to invest in adaptation measures in Germany.



Discussion: Kattenberg/KNMI: You make a matrix of climate and socio-economic scenarios with 16 options: how do you select the scenarios? Furthermore Germany (Max Planck) uses other scenarios. KNMI W+ is selected out of the four options. SG EU City development: Are similar efforts done in other areas in the world (Danube) and other (India, China: Yangtze) where comparisons are made? Gert Becker answered that dissemination is done but truly comparison is difficult because of the other settings.

Holzwarth (current chair of the Rhine Commission) states that the ACER project is an important project. The ministers of the countries in the Rhine basin will convene in October. The Netherlands will play an important role.

- Dr. Mark Koetse, Vrije Universiteit, Consequences of climate change and weather conditions for the transport sector  
The consequences of climate change for the transport sector (model choices) are presented (navigation, railway, road, air transport). The usefulness of the KNMI scenarios for this project is discussed. The effect of weather patterns on model choices is first analysed by statistical analysis based upon available time series (data). The effects analysed are subjects such as congestion and delay time due to weather conditions. The results show that low water levels have significant negative economic impact (historical analysis), price per tonne transported goods increases. A scenario analysis is done, the baseline is a year with no extreme low level situations. These are compared with the KNMI scenarios. Changes in model choice and socio-economic damage within several scenarios are  
Discussion: technology development (new ships, etc.) is not included in the analysis, nor is the effect of visibility (fog/mist).

- Laurens Bouwer, Vrije Universiteit, Financial arrangements for disaster losses under climate change  
First he shows a graph where weather disaster losses are presented in a normalised way (normalised for demographic changes etc.), so disaster loss is not presented in monetary terms. The graphs show that the vulnerability to weather related disasters is increased, rather than due to a change in climate variability. Vulnerable areas are situated near the coasts all over the world (Munich Re graph). Activities include the development of flood risk model (Monte Carlo Flood scenarios) and the quantification of economic losses due to droughts and hail damage. For flood losses the different insurance options all over Europe were presented. Flood insurance demand is assessed by Contingent valuation and Laurens Bouwer stressed the use of softer adaptation measures next to infrastructural measures.

- Dr. Jeroen Aerts, Vrije Universiteit, Room for safety (new approaches to flood risk management under climate change) (AVV project)  
An important objective of the AVV project is to develop a DSS (safety planning tool) for safety to floods in the Netherlands. Jeroen Aerts explains the participatory design/planning of the Netherlands, including adaptation by using (extreme) scenarios. A plan to elevate future housing regions in the western part of the Netherlands and connect them is included in the project. Also included in the project is a study on dike elevation with multiple functions, besides the protection to neighbouring areas).

## Session 1D: Integration: participatory methods

Chair: Tom Kram, Environmental Assessment Agency

### Presentations

Dr. Matthijs Hisschemöller, Vrije Universiteit, PRObing a method to Facilitate the Interactive Linking of Expert Knowledge to Stakeholder Assessment (project IC8)

Dr. Joop de Boer, Vrije Universiteit, Risk communication in knowledge production and utilisation for climate change prevention and adaptation (project IC7)

Dr. Judith Klostermann: Institutions for Adaptation: Are Dutch Institutions Capable of Adapting to Climate Change? (project IC12)

- Dr. Matthijs Hisschemöller: PRObing a method to Facilitate the Interactive Linking of Expert knowledge to Stakeholder assessment (PROFILES)

Project IC8 is designed to apply and improve dialogue methods in the climate debate. The planned steps in the project are to evaluate existing participatory methods, to design a new method PROFILES, to apply it in the climate domain and to evaluate the performance of the new method. The project is now in the phase of application: cases are found in the BSIK programme (bio-energy) and in the NWO programme (H2 dialogue). Today's presentation is mainly on the evaluation of existing participatory methods. The main idea in these



methods is that participation contributes to learning. It is important to have an open dialogue, and this means that conflicting lines of argument have to be articulated. If consensus is reached too soon, before differences are clear, the consensus will be superficial and may not contribute to anyone's goals.

Participatory methods have to facilitate an open dialogue. The design has to overcome automatic biases that occur in every dialogue: bias of source (who is talking? Positive source? Excluding people from dialogue?), bias of phrasing (e.g. objective words chosen by scientists and more emotional terms by lay people) and bias of attitude (people prefer views that confirm their own). Bias of source, for example, can be avoided with anonymous interviews. Bias of phrasing can be overcome by involving knowledge brokers. Bias of attitude can be overcome by role playing and gaming. General recommendations are to strive for heterogeneous stakeholder groups, to use methods that create some distance between subjects (people) and objects (the debate), and to make the different views accessible e.g. with the Toulmin method. Once the different views are brought to the table, a difficult social and political process starts, in which it is not always easy to come to conclusions.

*Discussion:* The goal of the method is to develop options and give equal merit to each option. Then when you bring people together, they usually see ways to cooperate. This project is part of the Integration theme, although it looks more like communication. The reason is that the theme started off as Integration and Communication, and Communication split off later as a separate theme, with a mostly non-scientific character. The combination of qualitative and quantitative methods is new, and the idea of enhancing conflict instead of striving for consensus only is new. Furthermore, we build on existing knowledge and bring this to the arena of natural scientists where this is relatively unknown.

How does this project connect to the rest of the programme? The first idea was to link it to coastal defense, fen meadows and communication projects. However, these projects were cancelled or delayed and we found applications later in the NWO programme and in ME4 on bio-energy.

Do you also provide guidance for decision-making? The point is to base decisions on competing alternatives. The government should monitor if there is enough competition in the market, and if there are no competing, sustainable alternatives because of institutional barriers, the government should do something about these barriers. Then the market will work out the best solutions by itself.

Do you use the internet for the dialogue? Not yet, we worked with face to face meetings until now. But it would be another option to create more distance.

- Dr. Judith Klostermann: Institutions for Adaptation: Are Dutch Institutions Capable of Adapting to Climate Change?

Project IC12 has only just started, so there are no results to present yet. The short presentation only outlines the research plan. Dutch society will have to adapt to climate change. Ecosystems and wildlife may need another type of National Ecological Network; more space is needed for water, and building plans may have to be realised in different areas. It is one thing to develop technical solutions, but will the Dutch authorities, companies and other societal organisations be able to carry them through? Many public authorities are trying to shape their policies in greater consultation with a range of civil society organisations ('from government to governance'). Does this interactive policy style lend itself to a problem such as climate change? The project uses the concept of 'institutions', which we understand to mean the rules and principles for conducting public life. Institutions can be organisations, but also laws and informal codes of conduct. The study will first develop a framework for assessing the adaptive capacity of a system of national institutions. This framework will then be applied to the Dutch administrative system. The project will look at four sectors: nature, water, agriculture and spatial planning.

*Discussion:* The title in the booklet 'Commissioned projects' (Institutional structure) is more clear than the title in the poster (Institutions). Because the research is about how different layers of Dutch government have to act. The title in the booklet was abbreviated for the poster. With institutions we do not mean organisations but systems of rules; this means laws, informal rules, and organisations can also be seen as systems of rules.

What are your links with other projects in the programme? Will you be pro-active in that? Firstly we are open for all demands for advice from other KvR projects, for example if they have problems with involving stakeholders in their project. Secondly we plan to build on the networks and information from all adaptation projects in the programme. We will probably use several Hotspot projects as case studies (Biesbosch and Noord-Nederland). The danger then is that we only have positive, innovative cases, maybe we also need cases outside the programme.

What methods will you use? Part of the project is that we will develop a tool for analysis, so I cannot say a lot about that yet. We will do case studies, at different policy levels ranging from national to local. In each case





study at least two or three of the policy domains should be involved: nature, water, spatial planning and/or agriculture.

Does the team have enough social scientific background? Or are you all natural scientists? Part of the team has a background in law and another part has a hybrid background: both natural and social science. This is necessary to bridge the gap between the other projects in the programme and the social scientific community.

Is it all adaptation that the project does, or also mitigation? Unfortunately we had to make choices because of the budget. Therefore we chose to do only adaptation, and only in four sectors, nature, water, spatial planning and agriculture. We certainly see mitigation as important, a similar project should be formulated, this would concern higher levels of EU and global; and we are ready to formulate it.

Will the project only do a diagnosis, or will you also come up with solutions? Diagnosis is an important part, but there is a parallel project on transitions, and we'll also look for innovative cases. Some first solutions will come out of that.

- Joop de Boer: Framing climate change and climate proofing: From awareness to action

Project IC10 has just started and today's presentation only gives an outline of the project. Frames are perceptual coordinate systems that align data from memory and data from the environment near to the person. Frames for abstract information processing are storylines and mental models. Based on mental models, for example, children can understand that dogs are different from tables. Dogs and other living kinds are seen as having an essence – a common cause of different dog-like phenomena. In contrast, tables and other artefacts have to be assembled; their different constituting elements produce the table-like function as their common effect. Climate change may be relatively easy to grasp if it is conceived as a common cause of various changes in nature. That is important in order to raise awareness of the issue. However, it should be emphasised that climate proofing will involve a different mental model. Moreover, it will require hard thinking to consider all the measures necessary to produce the common effect of a climate-proof country. Our objective is to make the role of frames in climate-related interactions more transparent for all the actors involved (e.g. scientists, practitioners, policymakers) by providing guidelines and practical tools. This should improve cooperation between climate scientists and stakeholders in the field, and will eventually lead to better decisions.

*Discussion:* Will you also use the concept of frame reflection? Yes, this is all about frame reflection. Making more than one frame explicit will make people see things in a different way.

Can you give an example of reframing in policy? If you look at the way people talk and write about climate change over the last ten years, there is a change from seeing it only as a threat to seeing it also as an opportunity.

Will it also give an impulse towards a new strategy? Our project is not about strategy, it is about making explicit how people see things differently. It is up to others to use this, for example for changing a strategy.

How is the link between this project and the one about dialogues (IC8)? The researchers of IC8 are part of the same group (VU-IVM). We try to cooperate on methods.

How is civil society involved in the project? Are you going to explain the theory to them, or will you only work with governmental institutions such as water boards? NGOs can become a part of the project. We have not involved them yet, because we have to decide on case studies first. I hope we can support them.

What is new in this project, compared to international research? The idea of framing is 30 years old. In the 1990's there already were studies on mental models and climate change. A new aspect is how you can use framing for innovation, and to build decision support tools based on the concept of framing.

How is this going to contribute to integration in the programme? What are the mechanisms for cooperation? It is not enough to be open to questions. Tom Kram, the Theme Coordinator answers: This is a valid point, and has been a main issue in the programme from the beginning. There are problems in practice because of early and late starts of the projects. We will have an IC workshop later this year and invite projects from other themes.

## Session 1E: Communication: Data portal and climate education projects

Chair: Florrie de Pater, Vrije Universiteit

### Presentations

Hans de Wolf, Dutch Space B.V., A virtual data centre for CcSP projects (project COM1)

Dr. Carolien Kroeze, Wageningen UR, Climate education: Summer schools on global environmental change (project COM12)

Fokje Bosma, COS Nederland, Check it out! Tools for a sustainable world (project COM13)



- Hans de Wolf, Dutch Space BV: A virtual data centre for CcSP projects

Aim of the project is dissemination of data for researchers in the form of one stop shopping. Geographically distributed data repositories are made accessible through grid and web service. So far the concept has been proven, the framework allows for additional function, but the work is not yet finished. The access rules are present, but the developers aim for improvements, for example performance of the system, a logging and reporting function and other ergonomic and cosmetic issues. Discussion: The problem is that projects refuse to deliver their data before they are published in Nature. Hordijk concludes that this is a subject for CcSP to work on. How do you communicate your own project to the users? The CcSP web portal could host a link.

- Dr. Carolien Kroeze, Wageningen UR: Climate education: Summer schools on global environmental change

Research school SENSE has organised two summer schools. The first on 'Understanding Global Climate Change' for PhD students in the natural sciences and the 2nd on: 'Earth System Governance for PhD students from the social sciences. The next summer school will be on Integrated Assessment of Global Climate Change and aims at students from both the natural and the social sciences. Hordijk wants to know if the summer school addressed any spatial planning issues. Pavel Kabat a.o. has mentioned these.

- Fokje Bosma, COS Nederland: Check it out! Tools for a sustainable world

Check it out! is not just an educational project for children of 10 years and older, it aims at a structural implementation in schools. Therefore the project works with a three year contract. The project starts with an energy scan. Through this scan a school gets tools for energy saving and thus cost reduction. The lessons are in this way supported by good energy practices in the school. A complication in this approach is that the school management and the teaching staff have to coordinate and cooperate, which is not an easy assignment for every school. In the discussion the following suggestions were made: a combination with the adaptation scan is possible (see COM15). Maybe the energy companies can adopt the project. At the moment research is conducted in the field of eco-schools, involve the Ministry of Education? Answer: Unfortunately the Ministry of Education is not very interested in the project. The chair concludes the session by thanking all participants for their clear, sharp questions and good suggestions for possible additional connections between projects.

## Session 2A: Climate scenarios: processes and tailoring

Chair: dr. Bart van den Hurk, Royal Netherlands Meteorological Institute

### Presentations

Dr. Herman Ridderinkhof, Royal Netherlands Institute for Sea Research, North Atlantic Ocean modelling and monitoring (project CS1)

Dr. Sjoerd Bohncke, Vrije Universiteit, Modelling and reconstructing precipitation and flood frequency in the Meuse catchment during the late Holocene (project CS9)

Dr. Janette Bessembinder, Royal Netherlands Meteorological Institute, Tailoring climate information for impact assessment (project CS7)

- Dr. Herman Ridderinkhof, Royal Netherlands Institute for Sea Research, North Atlantic Ocean modelling and monitoring

The North Atlantic Ocean is of crucial importance for the climate in (Western) Europe. To make predictions about changes in the European climate, measurements have been and have to be done (temperature, salinity) from various locations in the North Atlantic Ocean and also a better understanding of the processes that control heat transport in the ocean is needed. The general framework is reducing uncertainty in climate predictions. Model simulations suggest large influence of the so called overturning circulation on the European climate. But the ocean part of the Global Climate Models is still in its infancy, despite the importance for especially regional climate predictions. Hence, basic research in international framework is needed to improve ocean part of climate models.

Some conclusions from analyses of GCM's are the change in ocean heat transport compensated by atmosphere (and vice versa), but with a delay, so the ocean is important on longer timescales for regional climate. However, a comparison between (local) observations in Irminger Sea and GCM simulations is still very poor.

In the questionnaires, the relation between the CS1 outcomes and the IPCC reports were discussed. At the moment, there is not enough knowledge to predict the effect of the overturning circulation. Numerical errors,



which are large in some studies, ruins the simulations. But is that true? Maybe the outcomes in the IPCC reports have also to deal with numerical errors.

Another question was about the quality of the analysed data. The analysis do not have much variability. Some analyses can't be trusted, probably due to bad resolutions. How to proceed now? Using the best model and follow the plan!

- Dr. Sjoerd Bohncke, Vrije Universiteit, Modelling and reconstructing precipitation and flood frequency in the Meuse catchment during the late Holocene

This project aims to quantify natural variability of precipitation that may serve as a reference for possible future precipitation values and aims to establish and model the impact of past weather regimes and precipitation variations on river behaviour (especially floods), both under natural and anthropogenic conditions. It generates precipitation series and flooding frequencies from a time when human influences on natural processes were still insignificant. These paleoseries will be modelled to allow analysis of human influences on river systems in more recent situations and compared with natural influences. The study area for this project, with four subprojects is the Meuse river basin. Some general conclusions are: Two new analysis methods reconstructing the characteristics of past precipitation and river conditions have successfully been developed, and a coupled climate-hydrological model has successfully been set up for the Meuse river. This allows to assess the long-term natural variability in Meuse discharge and the influence of land-use changes and anthropogenic climate change on the mean discharge and flood frequency.

Discussion was held about the Subproject 2 result freshwater mussels are a good proxy for past river conditions. What is a good proxy in nerotive sense? Also the Subproject 4 result Modelled probability of daily Meuse discharge above a threshold, was not clear to all.

- Dr. Janette Bessembinder, Royal Netherlands Meteorological Institute, Tailoring climate information for impact assessment

In the Netherlands there is a good experience with the process of 'tailoring' in the field of climate information for the use in calculating discharges in the Rhine and Meuse. Of key importance is estimating extreme river discharges with recurrence intervals much longer than the length of the data series, by means of statistical extrapolation and precipitation generators. The resulting climate scenarios are applicable to the present (reference) climate. KNMI publishes its new 'generic' climate scenarios, the KNMI'06 scenarios (see [www.knmi.nl/klimaatscenarios](http://www.knmi.nl/klimaatscenarios)). These scenarios will serve as a blueprint for tailoring climate information required for project CS7 and other CcSP projects.

Tailoring is an interactive process. You should always ask the costumer specifications what data he wants to receive to avoid disappointments. The stakeholders were confused due to the uncertainties within the models. Modellers use different scales and models, but they don't have the time to use more. How are the interactions with the stakeholders? Many organisations in the water management sectors want to have time series for different scenario's, generally year-round. The costs depend on the type of the tailoring works: free use of the internet applications, but tailoring data is not free!

One person of the audience advices to extend the scenarios for broader European use. KNMI inventories the use of European databases. There should be cooperation with at least Germany.

## Session 2B: Land use and GHG balance: measuring and monitoring greenhouse gases

Chair: dr. Ronald Hutjes, Wageningen UR

### Presentations

Eddy Moors, Wageningen UR, Integrated observation and modelling of greenhouse gas budgets at the ecosystem level in the Netherlands (project ME1)

Dr. Ronald Hutjes, Wageningen UR, Integrated observation and modelling of greenhouse gas budgets at the national level (project ME2)

Nynke Schulp, Wageningen UR, Improving insight in soil organic carbon variability at landscape level (project ME3)

- Eddy Moors, Wageningen UR, Integrated observation and modelling of greenhouse gas budgets at the ecosystem level in the Netherlands

The main objective of this project is to establish a system that allows the best possible bottom-up estimate of the GHG balance of the Netherlands. The relation between emissions needs to be considered to quantify trade-offs. There are some actions which can be taken: water level manipulation, optimising depth of slurry



injection and co-locating slurry placement and fertiliser placement. During the discussion there was a question about how the trade-off between methane and CO<sub>2</sub> emissions was calculated. This is a complicated calculation but based on radiative properties.

- Dr. Ronald Hutjes, Wageningen UR, Integrated observation and modelling of greenhouse gas budgets at the national level

Greenhouse gas balances at regional scales are estimated by an atmospheric or top down perspective, by assessing spatiotemporal variability in biogene fluxes and by verification of reported emissions. The main conclusions at this moment are that time variations in fossil CO<sub>2</sub> emissions have a sizable impact. Efforts are needed to construct realistic time variations, which will be done in project ME3. The last conclusion was that intercomparison will lead to estimated impact on inverse modelling of biosphere fluxes. In the discussion was asked why the differences between top-down and bottom-up measurements were so high. This is probably because there are unknown emissions from for example wetlands or urban areas. The next step will be improving the methodology so that the incomplete information can be improved.

- Nynke Schulp, Wageningen UR, Improving insight in soil organic carbon variability at landscape level  
The main objectives of this project are to improve insight in soil organic carbon dynamics and variability. They do this by assessing how soil organic carbon dynamics are influenced by land use history and by management in forest and agriculture. Further they want to improve insight in the spatial distribution of carbon sinks by down scaling the sink estimates that are available at national level. The organic carbon stock in the soil is determined by biophysical characteristics like climate, parent material and ground water level. Other factors explaining the soil organic carbon stock are land use and management. In the near future there will be worked on an up-scaling work package and humus profile database coupling. In the discussion there was a question on the current state of knowledge on soil organic carbon change in 20 or 30 years. The team can not yet be very certain on how these systems will change since it involves a very slow process. During the overall discussion there was a debate about the lack of understanding of the basis of the system; for example precipitation might have a large influence on N<sub>2</sub>O emissions. Several people agreed that there is a lot of progress but that a lot of work is needed to narrow down the uncertainties.

## Session 2C: Adaptation: nature and biodiversity conservation

Chair: dr. Jeroen Aerts, Vrije Universiteit

### Presentations

Dr. Peter van Bodegom, Vrije Universiteit, Biodiversity in a changing environment: Predicting spatio-temporal dynamics of vegetation (project A1)

Dr. Claire Vos, Wageningen UR, Adapting the national ecological network to climate change (project A2)

Dr. Jaap van der Meer, Royal Netherlands Institute for Sea Research, Climate related shifts in the Netherlands continental shelf ecosystem and consequences for future spatial planning (project A6)

- Dr. Peter van Bodegom, Vrije Universiteit, Biodiversity in a changing environment: Predicting spatio-temporal dynamics of vegetation

Impacts of climate change (direct and indirect) on plant traits are assessed for both water and nutrients (step 1), finally translated in model projections for vegetation (step 2, probabilities). Step 1 includes the search for co-relations between leaf thickness and soil fertility and harmonisation of databases. In the next two years linkages will be made to climate scenarios and ecosystem models from MNP.

*Discussion:* What is the sensitivity of the ecosystem model? The number of vegetation types will influence the sensitivity (especially because the scattered co-relations that sum up). Will this model be better to model climate change impacts on vegetation? Other ecosystems use an envelope approach. Why do we need these type of maps, while we know by practice what the ideal optimal conditions are for vegetation in our area (Natuurmonumenten)? It are suitability maps, used for decisions at higher scales (national). Also the model is useful on local scale when a combination of measures are considered.

- Dr. Claire Vos, Wageningen UR, Adapting the national ecological network to climate change  
The approach and objectives of the project are presented. Impacts of climate change on biodiversity and evaluation of adaptation strategies by models, experiments and observations. An European map for the distribution of the 'Agile' frog is shown (envelope model) in 2050 under climate change. This map is



transposed to a suitability maps (habitat). In this way 'climate proof' maps were made that identify areas suitable for survival of the frog. Sometimes an area is suitable for a species but cannot be reached by the species (bottleneck). Another adaptation strategy could be to increase the colonising capacity? How to come from static to dynamic models: introduction to the 'shaking window concept' is explained (METAPHOR model).

Preliminary results: population movement rate is smaller than the potential dispersal distance. Weather extremes and habitat fragmentation slow down population movement rate. With the climate envelopes it is possible to identify the main adaptation zones for many species.

*Discussion:* Is this model applicable for rare species? Rare species are rare because their dispersal capacity low. We do not aim to model all the species. The aim is to identify suitable areas for adaptation based upon a selection of species.

How are the results of project A2 used by (national) policy makers? Synergies with other policies are important (wet ecosystems and water management, rural area policies in the dryer areas).

Implicit is the assumption that fragmentation is not always bad, sometimes positive for biodiversity. The balance in connectiveness and complete isolation lays somewhere in the middle, we are aware of that.

- Rob Witbaard, Royal Netherlands Institute for Sea Research, Climate related shifts in the Netherlands continental shelf ecosystem and consequences for future spatial planning (project A6)

Issued research: primary production in the North Sea (algae; satellite derived estimates, a validation of the ERSEM model), benthos (organisms living on the sea floor), fish, in particular the changes in spatial distribution and the research on the CO<sub>2</sub> balance of the North Sea.

The ERSEM model makes (spatial) projections for primary production in relation to climate/weather. Simulations of the year 1997 were presented. The Pelagia ship does the measuring of CO<sub>2</sub> balance and the acidification of the North Sea, two surveys were done during the project period. What is the impact of increased CO<sub>2</sub> levels in the atmosphere? Fishstock and benthos data from different institutes were brought together in order to do trend analysis. It is not yet clear if observed changes can be attributed to climate change. First a better ecological model, than this model is used to assess possible impacts on climate change.

*Discussion:* Fish stock statistics are influenced by (over)fishing. How are you dealing with that? We look at non-commercial fish. But you have by-catch. The researchers acknowledge this difficulty, though assume that the analysis is still very valuable.

## Session 2D: Integration: integrated assessment

Chair: Tom Kram, Netherlands Environmental Assessment Agency

### Presentations

Tom Kram, Netherlands Environmental Assessment Agency, Integral analysis of mitigation options within sectors and regions (project IC2)

Eric Koomen, Vrije Universiteit, Localising the land use impact of global change: integration of sector-specific adaptation measures with the land use scanner (project IC3)

- Tom Kram, Netherlands Environmental Assessment Agency, Integral analysis of mitigation options within sectors and regions

Reasons for the integration of all GHG emissions into one model:

- all major emitters have to contribute to emission reduction to achieve 450ppm;
- land use is the second greatest emitter;
- land use can also be a sink and therefore has an important role in finding solutions.

IC2 goals are to construct an overall framework for assessment of mitigation options and to combine a number of models, such as IMAGE, CLUE and INTEGRATOR into one super-model. The models not only describe different subsystems, such as process emissions, energy, crops, land allocation, water and climate; they are also designed at different scales (global, Dutch...). The consequence of models at different scales is that they contain different levels of detail. The project is now working on alignment of all of these models and on a fast track analysis of emissions. Some first results: models mostly agree with each other. For a few indicators, this is not the case and analysis is now done why this happens. It is possible, for example, that the terms for methane and N<sub>2</sub>O emissions do not mean the same in each model. For forest area development the



first results indicate that for the carbon sink function, harvesting in itself does not matter: it depends on the use of wood (e.g. as fuel or as furniture). A draft report has been made on the food chain and the fast track analysis is near completion. In the future, more collaboration will be sought with IC3, and there will be a lot more work in model development.

*Discussion:* Are the models nested or independent? They were developed independently, we try to nest them now.

Similar efforts are made in the UK. Will you compare models internationally? There is not much multi-scale work going on yet, but what happens in the UK is interesting.

It is estimated that 10% of land cover in the Netherlands is urban. Do you take the transfer from agricultural into urban land cover into account? Yes, the CLUE model uses urban areas and their expansion as a factor. This is at the EU level; global models assume that the urban areas stay the same.

How does urban sprawl add to climate change? That is an interesting question, but it is not researched in our project.

- Eric Koomen, Vrije Universiteit, Localising the land use impact of global change: integration of sector-specific adaptation measures with the land use scanner

There are many influences between land use and the climate system. Land use influences the climate through emissions and reflection of radiation. The climate influences land use for nature, water storage, and so on. To align these systems into one model is not easy, also because climate models are made at the global scale and land use models at the national scale. The land use scanner has been used for 10 years in spatial planning and in MNP reports (the Dutch 'EPA'). It simulates future land use based on linear trends, scenario's and impact assessment. It is GIS based and contains geographic information. Recently, the model has also been used for the Berlin area, using the same algorithms. The algorithms of the Land use scanner are based on classic economic theory of balancing supply and demand towards optimal wealth. One input are regional land claims, the other is information on suitability of land. Suitability of land info is based on current land use, physical aspects, policy maps (e.g. EU Habitat areas), and distance relations (e.g. distance to railway, airport). Both of these inputs go into the allocation module and this produces future land use.

A first effort in IC3 has been to upgrade the land use scanner from a 500m<sup>2</sup> to a 100m<sup>2</sup> grid. This was an important improvement, because now canals show up and there are not that many mixed cells anymore (for example, a mix of urban and agricultural land use).

The ultimate goal of IC3 is to evaluate adaptation strategies. It will produce a baseline outlook for 2040 of land use for urban, water and nature functions. For this exercise, a consistent scenario framework is necessary. Both climate scenario's from KNMI and socio-economic scenario's from WLO are used (RC+ B2 and GE+A1). Other goals of the IC3 project are calibration efforts, 3D visualisation, development of methods to enhance group interaction, and conflict analysis between land claims. The calibration has started with a simulation of development of a 1993 map towards a 2000 map and comparison with an actual 2000 map. It turned out that gradual expansions are predicted quite well, but big expansions are not recognised. Stakeholder interaction efforts included introduction of a Touch Table and a stakeholder session that worked with clay. The clay model was translated back into a GIS map, and contained quite a few innovations for the Netherlands, such as moving everyone to the province of Brabant and putting the western part of the land under water.

*Discussion:* Is urbanisation not a much more important driver for land use change than climate change? And agriculture is driven by the economics of private farms. How do you cope with that? Agriculture is a private enterprise, that is true, but it is also guided by economic regulation of the EU. The basic idea is that there will be less arable land in the future. Urbanisation is controlled by planning regulations, for example buffer zoning, the 'Green Heart' and designated growth areas. We play with scenario's by giving these regulations different weights.

Would an increase in subsidy lead to an increase in agriculture? Most agricultural practices loose land in all scenario's. Only greenhouses go to different locations, depending on the scenario.

How rigorous is the underlying model of the Land Use Scanner? It is based on well established theory and has been reviewed well recently. The scenario conditions, however, are based more on imagination.

What are the relations and feedbacks with other projects in the programme? There is close interaction with the water project A7. They have sent 'space for the rivers' maps which are now integrated into the simulations. The projections of the 'terpen' option in A7, in turn, was produced by IC3. With other projects, similar cooperation is planned.

Is the model also used by policy makers? It is an open source model, but working with scripts is too difficult for outsiders. A personal interface is necessary to translate ideas into the model runs. For this, we also use the Touch Table (or Map Table).



Is it possible to build a simple interface? It would take a giant effort to make it user-friendly. Remark from the audience: a human interface is an advantage, it is not wise to develop a mechanical interface.

Is the scenario framework very structured? When you exchange information, do you check similarity in scenarios? We try to achieve that. We see the WLO scenario's as the standard and hope that other projects will do the same.

CPB says that a spatially explicit model for future scenarios is not necessary, what is your view on that? There is a controversy between the economic planning bureau CPB and the environmental planning bureau MNP about this. MNP needs a spatially explicit model to do their analysis. CPB thinks a spatially explicit model is too detailed for future projections; you can say at most that in the western part of the Netherlands there will be more urbanisation and more economic development than in the eastern part. My opinion is that economic projections are equally uncertain. We present options, possible futures, to inspire choices for spatial adaptation.

## Session 2E: Communication: reaching the stakeholders

Chair: Florrie de Pater, Vrije Universiteit

### Presentations

Arnold van Vliet, Wageningen UR, Nature's Calendar: an example of successful involvement of stakeholders in monitoring, analysis and communication of climate change impacts (project COM6)

Alphons van Winden, Stroming, Deltas in times of climate change (COM11)

Lodewijk Stuyt, Wageningen UR, Climate proofing atlas (COM21)

Paul Kersten, Wageningen UR, Climate adaptation scan (project COM15)

- Arnold van Vliet, Wageningen UR: Nature's Calendar

An example of successful involvement of stakeholders in monitoring, analysis and communication of climate change impacts (COM6) The objective of nature's calendar is to monitor, analyse and predict time of life cycle events. The project now has 7.000 observers and several 100 school children. In the strategy of the project dissemination is very important. The outreach of the programme (based on number of radio/TV and newspaper readers) is 1.400.000 people. Hordijk raises the question of statistical reliability of observations. Answer: We use the median dates. Stability of observations over time? One year we have more observations than other years, but median dates are less sensitive to variation in quantity. Some people seem to give fake information on the radio programme Early birds? Indeed, most of these observations are not usable. How much money is saved on hay fever medicine? Most people, including doctors, don't know when the season starts, so here is something to be gained.

- Alphons van Winden, Stroming, Deltas in times of climate change

Delta areas are very vulnerable to disasters and extreme events. Technical measures have negative side effects on the long term. Objective of the study was to explore potential for system-based measures, using natural and dynamic forces, in deltas all over the world. Deltas were screened for their potential as indicator for physical vulnerability, the number of people in danger and the potential for soft system-based measures. On this basis 20 delta area's were selected for further study. In response to a question about the basis of this ranking, the speaker indicated that a website is available from which it is possible the make your own selections based on own criteria.

- Lodewijk Stuyt, Wageningen UR, Climate proofing atlas

All provinces must develop new spatial planning and zoning schemes. The climate atlas is meant to be a tool for this purpose. The province of Zuid-Holland is pilot province for this project. On the basis of a dynamic interactive process the thus created atlas needs to be adaptable and will develop into a geo-database. Q: will the atlas be available to the general public? Maps should be cautiously handled. The issues can be extremely sensitive, for instance with respect to indicated areas for flooding risk. A lot of turmoil can be generated, if people try to find their own back yards on these kinds of map.

- Paul Kersten, Wageningen UR, Climate adaptation scan

Like the climate atlas the scan is a rather new project, and meant for use by the local government. With decentralisation of spatial planning, a need for the translation of regional information to local scale develops. Characteristics of the approach are: Combine expert and tacit knowledge (for instance there is local knowledge on the microclimate), include the unknown (local problems might be overseen by climate specialists), interaction with stakeholders by developing a 'community of practice' by means of techniques like



SWOT analysis and group decision room. Q: How are you going to deal with issues the local governments don't want to admit to be climate related? A: They will, for example it was discovered that there are local monuments with tiles on the roof that are only safe up to a wind speed level of 10. So it might be that some of these unexpected factors will become priority programmes.

### Session 3A: Climate scenarios: model studies

Chair: prof.dr. Bart van den Hurk, Royal Netherlands Meteorological Institute

#### Presentations

Frank Selten, Royal Netherlands Meteorological Institute, Remote Influences on European climate (project CS5)

Dr. Erik van Meijgaard, Royal Netherlands Meteorological Institute, Refinement and application of a regional atmospheric model for climate scenario calculations of Western Europe (project CS6)

Dr. Theo Brandsma, Royal Netherlands Meteorological Institute, Time series analyses (project CS8)

- Frank Selten, Royal Netherlands Meteorological Institute, Remote Influences on European climate  
This research examines the influence of large-scale climate variability and weather patterns on extreme weather events in Western Europe. The natural and anthropogenic causes of climate variability have been analysed. Frank stressed some research questions during his presentation. The local processes in soil, clouds and radiation and remote influences, such as the blowing wind, determines the regional climate. Local weather conditions are usually connected to typical large-scale circulation anomalies. Circulation changes are uncertain, can we trust the outcome of the model? Why do the models predict more easterly wind flows in the summer?

The research agenda focuses on the need of research the models. Little is understood about the response of the circulation to increasing greenhouse gas concentration.

After this presentation there were no questions or remarks given.

- Dr. Erik van Meijgaard, Royal Netherlands Meteorological Institute, Refinement and application of a regional atmospheric model for climate scenario calculations of Western Europe

This project generates basic climate scenarios for the use in other CS projects. The output to other projects is being done by the Tailoring project, in which information from CS6 will be refined and further adapted for specific uses. In his presentation he explained the relation between the different CS projects and he discussed some achievements till to date. An important relation is with soil moisture, and a super storm will bring more information for modelling.

One question was the relation between this project and ocean modelling projects. In generally there is one, but take that data into account even CS6 is just a model for local scale use.

- Dr. Theo Brandsma, Royal Netherlands Meteorological Institute, Time series analyses

In this project historical time series of important climate variables has been digitized (4.7 million observations to date; another 50% of the data has to be collected for digitizing), analysed and made available to various users. This information is used for validating climate scenarios, defining a reference climate and for environmental impact studies. Key deliverables from this project are a series of daily precipitation figures for the period 1850–2000, a series of 5–10 minute precipitation data in the 20th century and series of historic weather data from the period 1700–1850.

The work on datasets proceeds well, although some extra personnel should be hired to keep the original work schedule. The digitisation of dataset 2 (High resolution precipitation time series) may be of interest for many more meteorological groups in the world.

### Session 3B: Land use & mitigation: peatlands, climate and planning

Chair: Dr. Ronald Hutjes, Wageningen UR

#### Presentations

Dr. Jan Vermaat, Vrije Universiteit, Optimization of the spatial arrangements of Dutch fen meadows for multifunctional use and climate services (project ME5)

Dr. Ron Janssen, Vrije Universiteit, Spatial decision support for management of Dutch fen meadows (project ME6)

- Dr. Jan Vermaat, Vrije Universiteit, Optimisation of the spatial arrangements of Dutch fen meadows for multifunctional use and climate services





The aim of the project is to analyse the effects of climate-related changes in hydrology (water input and water levels) in fen meadows on water quality change and carbon storage in networks of wetlands of variable connectivity and spatial extent. Their research is divided in two components: 'water quality' and 'carbon sequestration and greenhouse gas emission'. There are some possible problems that have to be negotiated for each polder such as spatial and temporal mismatch (data are obtained from very different sources), data gaps and heterogeneity within polders and seasonality. In the coming period the team will continue with their measurements and modelling. In the discussion it was asked how the spatial arrangements of the Dutch fen meadows would be optimised. The answer was that when the different effects of climate-related changes in hydrology are known, it will be possible to calculate the optimal orientation, amount and type of fen meadows. The results of this project can probably be used in project ME1 and ME2.

- Dr. Ron Janssen, Vrije Universiteit, Spatial decision support for management of Dutch fen meadows  
The project objectives are to make knowledge available to planners and stakeholders and to develop a Decision Support System to support land use planning in fen meadow areas. The first objective is being realised by an interactive website and the second objective is being realised by developing a touch table. The thought behind developing collaboration with the public is that people want to change, but don't want to be changed... therefore they want to be involved. To fulfil the needs of different end-users, different kinds of maps are being developed. The next steps in this research are to continue developing the touch table application and to continue organising different workshops. In the discussion was asked what the connection is with the other ME projects. Ron Janssen answered that this tool will help in the political decision making process. A comment was made that the project is about water management and not necessarily about climate change. This project however is part of a larger system and will therefore contribute to solutions in climate related problems.

### Session 3C: Adaptation: sectoral aspects and regional approaches in 'hotspots'

Chair: dr. Jeroen Aerts, Vrije Universiteit

#### Presentations

Linda Frinking, Hans de Moel, Province Zuid-Holland, HotSpot ZuidPlaspolder (regional adaptation strategy) (project A14)  
Hans Schneider, BuildDesk Nederland BV, HotSpot Tilburg: a multi-stakeholders approach for an integrated local climate policy (project A16)  
Rob Roggema, Province Groningen, Developing a method to adapt to climate change in regional planning: case Groningen (project A18)

- Linda Frinking, Province Zuid-Holland, HotSpot ZuidPlaspolder (regional adaptation strategy)  
The project is carried out by Xplore lab (Province of South Holland). The ZPP is assigned for urban development in the Nota Ruimte. Planns are: houses (7000-30000), greenhouses (280ha). The project has a model phase (risk maps), design phase and calculation phase (CBA) done in close cooperation with planners. Precipitation scenarios are used for SOBEMK modelling (water quality and quantity) applicated for the Zuidplaspolder. One identified adaptation strategy can be risk zoning, also old creek ridges can be used for housing. Development of waterbuffers in case of droughts (adaptation strategy 3), design escape routes. CBA takes into account risk and damage reduction. Multi-criteria analysis is used. The question is if the spatial plans need to be modified, and if so how.

*Discussion:* How is stakeholder participation being done? Interviews are done with local people, also done within CBA (valuation of nature).

How do you involve the farmers in particular? This is done in the spatial planning process, which is a parallel process next to this project.

Do you take into account social aspects, for example, a house near an escape route might not be appreciated. This is type of aspects is not yet taken into account, we invite researchers.

Solutions on local level might be inappropriate on national level, problem shifting between areas might also occur.

- Hans Schneider, BuildDesk Nederland BV, HotSpot Tilburg: a multi-stakeholders approach for an integrated local climate policy  
The project got a benchmark from the municipality of Tilburg (T-mark) because of its innovative character. The establishment of Public-Private Partnership is an important objective, the project looks both at adaptation and mitigation. Tilburg is at front regarding energy policies. The project started with a stakeholder survey



(before Al Gore), followed by funding acquiring and building public-private coalitions. The project team assessed, based upon local climate scenarios, which impacts are important for Tilburg. Also local energy supply/demand scenarios were developed. At the end of the project a sustainable platform should be established that is a public-private partnership on climate policies.

*Discussion:* Do you have concrete ideas for adaptation? There is a list with adaptation options, which includes measures such as innovations in sewage systems and installation of air conditioning in retirement homes. Are there links with other CcSP projects? Yes, we are interested in the governance project of CcSP (IC12). We would like to ask them how to keep climate change on the local policy agenda on the long-term, it is now driven by the dynamics of elections. More vegetation and water in the city is considered as a good adaptation option by both the researchers and the audience. It was observed that most of the named adaptation options are in fact a measure for climate variability, not climate change. The researchers are aware of that, they are careful, because they do not want to develop a 'new' policy line (adaptation), but want to extend existing policies with adaptation. The question was raised who is responsible for taking the measures in case of a health wave/ It was stated that the municipality is not responsible but cannot ignore media attention and has to say something about it.

- Rob Roggema, Province Groningen, Developing a method to adapt to climate change in regional planning: case Groningen

The 'structuurvisie of the province Groningen', or better the planning process that goes along is an important subject of the project. The implementation of climate change in the new spatial law and the building of regional alliances are important additional objectives. 'Climate Claims' are assessed in dialogue with stakeholders and finally it is the aim to have a climate proof regional spatial plan.

Climate scenarios from KNMI and IPCC were combined and averaged. Next to these an extreme scenario was developed (melting land ice). Precipitation maps were developed for Groningen.

What will happen with SLR is a one meter rise before the end of the century, without adaptation: a map where the northern part of the Netherlands is flooded. The Eemshaven is dry even in a SLR scenario of 150 cm rise. They explored a measure to develop a second row of Wadden Islands.

Energy potentials of Northern parts of the Netherlands (biomass, solar, wind, water); mixed energy landscapes. Integrated spatial-climate map is presented: new water storage areas are allocated, idem building areas, agriculture and nature areas. Delfzijl and Eemshaven are mapped in detail (local scale climate-spatial planning maps).

*Discussion:* Did you take into account present EU directives (such as Natura 2000 etc...)? Not necessarily all of those and we did not try to change them.

Will be our future landscape be interesting/appreciated by the next generation? And where will the children play? The current and future climate proof landscape is assumed to be child friendly by the hotspot presenters.

### Session 3D: Integration: socio-economic research

Chair: Tom Kram, Netherlands Environmental Assessment Agency

#### Presentations

Prof.dr. Piet Rietveld, Vrije Universiteit, Cost benefit analysis of adaptation and mitigation strategies (project IC5)

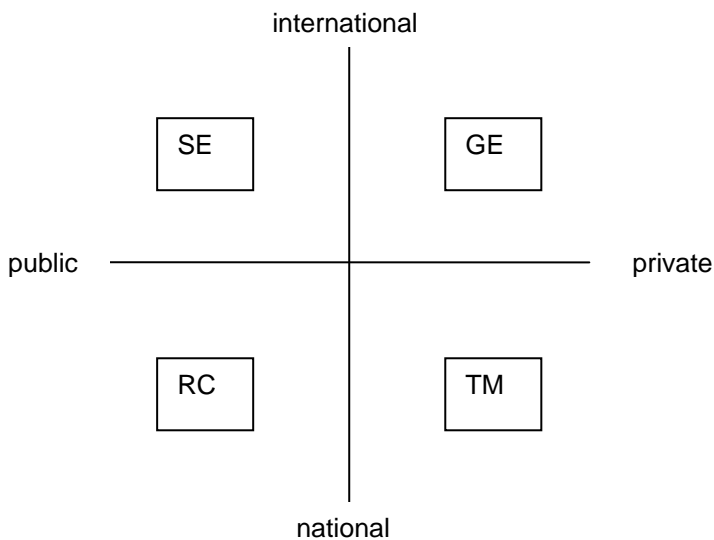
Prof.dr. Frans Berkhout, Vrije Universiteit, Socio-economic scenarios for climate change assessments (project IC11)

Karianne de Bruin, Rob Dellink, Wageningen UR, Netherlands national adaptation strategy: Options and related costs (project A11)

- Prof.dr. Piet Rietveld, Vrije Universiteit, Cost benefit analysis of adaptation and mitigation strategies

In IC5 there are 3 sub-projects:

1. Estimation of VOSL in flood safety: VOSL = Value Of Statistical Life, the willingness of people at risk to pay to reduce a risk, for example the extra costs of a safer car. The concept is used in other domains, and in this project it is applied to flood safety. The risk of a flood is small, and people are not good in dealing with small risks. There are 53 major dike rings in the Netherlands, and the risks are different. It is not only about the risk to die, but also about damage and stress. In a survey, about 1000 people are interviewed to be able to measure the variations in the valuation of flood risk.



2. Integrated modelling of cost-benefit and land use: The model has to improve decision making tools for spatial planning. It includes uncertainty and irreversibility. The first phase is a literature review about the economics of climate change. Then adaptation options will be assessed, and finally the model will be linked to the case of Zuidplaspolder, which is also a Hotspot project in the programme. The approach used is the 'option value of waiting': the costs of postponing a

decision until more information has become available.

3. Valuing (perception) of environmental risks: Small risks are difficult to recognise. How do they influence behaviour? What perceptions do people have of risks, and what is the social support for certain policies? The research intends to show the differences between risk areas.

*Discussion:* Your research is about personal decision making. Can this be translated to governmental decision making? We reconstruct the choices of individuals, which is not easy because there is no proper market from where we can see the price of flood risks. So we simulate a situation that comes close to a market. Consumer sovereignty is an important pre-assumption in this kind of research. Consumer sovereignty means that the government takes safety related valuations of citizens as its starting point in policy making. This would mean that the government takes decisions in a way that is consistent with what consumers value most. However, if the government thinks it knows better than the consumers, because consumers have distorted views, it can deviate from consumer preferences.

Is the wait and see approach of the second subproject applicable to floods? That is a good question to be put on the agenda. Is it as urgent as the Stern report claims it is? Or is it better to wait? The outcome of the method is not necessarily that it is better to postpone measures.

- Prof.dr. Frans Berkhout, Vrije Universiteit, Socio-economic scenarios for climate change assessment  
To say something about the future impact of climate change, we also need to know how society might change. The goal of this project is to develop a common set of scenarios for the programme, so that results can be integrated in the end. Also an inventory will be made of what parameters different projects need. There are different kinds of scenarios:

- extrapolating, showing autonomous developments;
- exploitative: a number of scenarios is constructed to create as possibility space
- normative: a preferred future followed by back casting.

WLO scenarios are exploratory, but they have many extrapolating characteristics. There are four storylines and a quantitative approach is used. There are no policy assumptions in the scenarios.

The IC3 project already uses the GE and RC scenarios and combined them with two plausible climate scenarios, because they did not want to work with 16 scenario combinations. If all projects start 'scenario shopping', then end results will not be comparable.

In project IC11 there has been a participants workshop. Compared to the WLO scenarios the participants wanted more exploration (less business as usual) and a longer time horizon (2050 instead of 2040). Also, they would prefer internet data over a printed book. In the programme, 14 projects have been identified that use scenarios. Future challenges for the project: non-linear trend reversals, large impacts, an extended time horizon (2100) and making the WLO scenarios more user-friendly, for example through the internet.

*Discussion:* How do you use information from other projects? Do they develop scenarios that you can use? We have workshops and ask: what do you need to know. Then we report and make it available. We try to make people use similar, if not the same models. We cannot be too rigid, because people often have good reasons to choose certain scenarios.

It has been difficult to communicate scenario results to policymakers, especially uncertainty thinking. What is your opinion? Yes, it is a fundamental problem. The simple view, to manage and control, is dangerous because there are many futures. Every policy is in favour of a certain future. Do we use a two degree assumption? Or a four degree assumption? In the project, we deal mainly with scientists, the main clients of the project, which is easier.



- Karianne de Bruin, Wageningen UR, Netherlands national adaptation strategy: Options and related costs  
The goals of the Routeplanner project were to collect existing knowledge, to define knowledge gaps and to support a national adaptation strategy. Methods were a literature review and a number of expert workshops. From this, a database of adaptation options was built, containing 96 options for many sectors. For these options, a multicriteria analysis was done. Criteria were: importance, urgency, no-regret characteristics, ancillary benefits, mitigation effect and feasibility. The last criterium consisted of the sub-criteria technical, social and institutional complexity. Next to the multi-criteria analysis a cost-benefit analysis was conducted. It was hard to find data, so the figures are only representing an order of magnitude. The exercise has led to a good overview of adaptation options. The cost-benefit analysis was not so successful because of a lack of data.

*Discussion:* You say you cannot add up the total costs because of lack of data, but a figure was mentioned to a journalist. But it is only an indication, an order of magnitude. Remark from the audience: It was a struggle in the debate to avoid numbers, but we appreciated the courage of the researchers to come up with at least an indication.

The list of benefits is also empty. You should try to put a number to it. That is part of my present research. The Routeplanner project was done within a time constraint.

Who decided on the scoring and weights given the criteria? It was done through subjective expert judgment and an expert workshop.

CPB stated that the cost of adaptation would be 0,1% of GDP. Was this number used? We did not cooperate directly with CPB. Maybe we will in a later phase, as a part of my research.

Remark from audience: CPB only calculated the cost of dikes, the Routeplanner is more complete.

## Session 3E: Communication: reaching a broader spectrum of professional and policy making stakeholders

Chair: Florrie de Pater, Vrije Universiteit

### Presentations

Dr. Rob van Dorland, Royal Netherlands Meteorological Institute, Platform Communication on Climate Change, PCCC (project COM3)

Florrie de Pater, Vrije Universiteit, Network project for organizing dialogue (project COM4), Knowledge diffusion and uptake (COM18)

Bert Enserink, TU Delft, Climate change in the city (project A17)

- Rob van Dorland, Royal Netherlands Meteorological Institute, Platform Communication on Climate Change (PCCC)



Purpose of platform is to provide integral climate information. Activities are a Climate portal (primary Dutch information), Popular science reports, Climate update and climate days and Ad hoc and dialogue workshops. Examples of publications: State of the climate 2006, The IPCC report and its meaning for the Netherlands (2007). In development is a frequently asked questions (FAQ) section on the website, which covers questions of climate sceptics and the general points of view of the science community, argumentation and uncertainties, and a reference to scientific publications. In the discussion about approach of climate sceptics: if you invite someone from science and a climate sceptic, for a dialogue, you risk that the media will take the climate sceptic too seriously. A: the objective of PCCC is to provide the public with objective scientific information, we choose what publication to take seriously, we don't react to every publication in the media.

- Florrie de Pater, Vrije Universiteit, Network project for organising dialogue  
Priorities in the project are: Inner circle (reinforces the network); Parties with a role in spatial planning; General public and education. Means are awareness-raising through: Climate magazines (4 issues) and other publications in magazines, COS; Climate roadshow for provinces and municipalities; the travelling Climate Quiz and participation in climate activities of other organisations. The project has already started, but we do try to create possibilities for other societal partners to join. Dissemination of information through: Newsletter for provinces; CcSP newsletter; Press releases; Support of projectleaders in making press releases and writing articles for popular magazines. Bottlenecks and dilemma's: Climate change and adaptation have



become hot topics, so demand for knowledge is pressing. We need more fast track information. If governments are not getting data from research soon enough, they will go to consulting firms. Other questions: Preparing a project that can pass scientific standards and that is of relevance to stakeholders and how to motivate the business community.

- Florrie de Pater, Vrije Universiteit, Knowledge diffusion and uptake

A lot of stakeholders don't know what research is going on, and not all research projects are prepared in cooperation with stakeholders. Results are disseminated in scientific papers. Objective of the project are to link demand and supply, by organising debate focussed on stakeholder needs (e.g. debate on heat in the City) and add a dialogue platform to the CcSP website and make the search for accessible knowledge easy. In the discussion a suggestion was made to look at UKCIP experience. The programme needs more antenna's in the field, there is much more knowledge than scientific knowledge alone. From experience with Nature's calendar we see that people start to think and ask questions, this will stimulate scientists to leave their ivory towers.

- Bert Enserink, TU Delft, Climate change in the City

The bottom up approach of this project is different from most supply driven research. Central is a stakeholder dialogue project that feeds into 2 scientific projects. Also, it provides for fast track information. (see COM 4) Outcome of a preparatory workshop was a knowledge need on the heat island and health effects. Next step is the international workshop: Hot Places Cool Spaces on climate change and the urban heat effect, followed by case studies. Q: what can we learn from France? A: we don't know yet, it seems that in health effects humidity is of relevance in combination with heat, but this needs to be researched. In the discussion the need for fast track knowledge was stressed, as examples were mentioned of current spatial planning projects and activities where decision makers remain completely oblivious to possible detrimental health effects.



## Closure

Prof. Leen Hordijk, Director International Institute for Applied Systems Analysis, Austria, Chair CcSP International Scientific Advisory Council

Prof. Pier Vellinga, Chair of the Board Foundation CcSP, Wageningen University and Research Centre, Vrije Universiteit, the Netherlands

Prof.dr. Pavel Kabat, Science Director and Chair of the Programme Council, the Netherlands

Impressions by Leen Hordijk, Chair Scientific Advisory Council:

- Leen Hordijk was impressed by the number of projects (over 40), interactions can be improved but the commitment is there.
- A large part of the projects are led by KNMI, Wageningen UR, Vrije Universiteit Amsterdam (77%). Can spatial planners be found at other universities?
- A lot of climate research is going on in this country. How can the landscape be structured. A suggestion to CcSP, ARK and NOW: do something together and not separate from each other.

Leen expresses his thanks to the Programme Office Climate *changes* Spatial Planning, Pavel Kabat and Pier Vellinga for organising this conference.

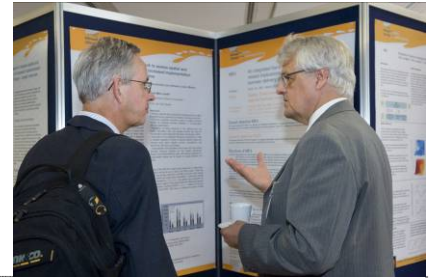
Pavel Kabat states that he is proud of the scientific excitement during the conference and proud of the started interest from spatial planners. In 2011 we hope to have a lot of successful PhD students, and amongst others a special issue of Nature. We need to be more persistent in getting social scientists on board, we also need to be more proud of the communication part of the programme.

According to Pier Vellinga we have succeeded in bringing together a whole community, dialogue with policy makers. In 2011 we aim to have a much better interrelation with spatial planners, this is crucial for the next two years. We aim to have more universities on board. The new programme 'Kennis voor Klimaat' will help that.



## Poster presentations

The posters can be downloaded from [www.klimaatvoorruiimte.nl](http://www.klimaatvoorruiimte.nl) or [www.climatechangesspatialplanning.nl](http://www.climatechangesspatialplanning.nl), pages CcSP conference or via the page publications (search in publication database, search project).



Project	Title poster	Poster presenter
A1	Biodiversity in a changing environment: predicting spatio-temporal dynamics of vegetation	dr. Peter van Bodegom, Vrije Universiteit
A1	Water - vegetation interactions	Ruud Bartholomeus, KIWA Water Research and Vrije Universiteit
A1	Linking plant traits to soil nutrient availability	Jenny Ordonez, Vrije Universiteit
A2	Adapting the national ecological network to climate change	Dr. Jana Verboom, Wageningen UR
A2	How will climate change affect spatial planning in agriculture and nature?	Dr. Greet Blom-Zandstra, Maurice Paulissen, Wageningen UR
A2	Genetic factors in metapopulation survival, introduction to a PhD project	MSc. Marleen Cobben, Paul Arens, dr. Jana Verboom, Wageningen UR
A2	Climate change and habitat fragmentation: range shifts for Dutch butterfly species	Arnouk Cormont, Wageningen UR
A2	The influence of temperature and solar radiation on the behaviour of butterflies	A. Malinowska, Anouk Cormont, Wageningen UR
A2	The Dutch flora in a changing environment	Marleen Pierik, Wageningen UR
A6	Climate related shifts in the NCP ecosystem and consequences for future spatial planning	Rob Witbaard, prof.dr. Hein de Baar, dr. Han Lindeboom, NIOZ, dr. Hans van de Woerd, Vrije Universiteit, dr. Adriaan Rijnsdorp, Wageningen UR
A7	The relative importance of topography and land use on rainfall patterns	Eddy Moors, Herbert ter Maat, Wageningen UR
A8	Climate change, adverse weather conditions, and transport: A literature survey	Dr. Mark Koetse, Vrije Universiteit
A8	Climate change and inland waterway transport: Welfare effects of low water levels on the river Rhine	MSc. Olaf Jonkeren, Vrije Universiteit
A8	Modal split effects of climate change: A study to the effect of low water levels on the competitive position of inland waterway transport	MSc. Olaf Jonkeren, Vrije Universiteit
A8	The impact of weather and climate change on modal choice and road transport	MSc. Muhammad Sabir, Vrije Universiteit
A9	Climate change and insurance of losses from extreme weather	Laurens Bouwer, Vrije Universiteit
A9	Global warming and insured agricultural hail losses: increased exposure with temperature in the Netherlands	Lauwerens Bouwer, Vrije Universiteit
A11	Routeplanner	Ralph Lasage, Vrije Universiteit
A12	How can agriculture adept to changes of both climate and market; NL-North as a pilot region	Dr. Jan Verhagen, Wageningen UR
A14	Zuidplaspolder Hotspot	Linda Frinking, Province of Zuid-Holland
A16	Hotspot Tilburg: engaging stakeholders in a long term mitigation & adaptation programme	Hans Schneider, BuildDesk Nederland BV
A18	Developing a method to adapt to climate change in regional planning: case Groningen.	Rob Roggema, Province of Groningen
COM1	A Virtual Data Centre for CcSP projects (project COM1)	Dr. Eric Boom / Hans de Wolf, Dutch Space B.V.
COM4	Network project for organising Dialogue (1)	Florrie de Pater, Vrije Universiteit
COM4 / COM18	Network project for organising Dialogue (2); Communication advisory group and knowledge uptake	Florrie de Pater, Vrije Universiteit
COM5	Climate changes Spatial Planning website	Fokke de Jong, Wageningen UR
COM6	Nature's Calendar	Arnold van Vliet, Wageningen UR
COM7	Summer Course on Climate and the Hydrological Cycle	Prof.dr. Han Dolman, Vrije Universiteit



COM11	Delta's in times of climate change	Dr. Ron Janssen, Vrije Universiteit
COM12	PhD Education: Three Summer Schools on Global Environmental Change	dr. Carolien Kroeze, Wageningen UR
COM13	Climate change and education	Fokje Bosma, COS Nederland
COM15	Climate adaptation scan	Paul Kersten, Wageningen UR
COM20	Animation films on climate buffers	Joost Hartog, Vogelbescherming
CS1	North-Atlantic monitoring and modelling	Dr. H. Ridderinkhof, dr. Hendrik van Aken, NIOZ
CS1	Analyses of profiling mooring and repeat survey observations in the Irminger Sea	Femke de Jong, dr. Hendrik van Aken, NIOZ
CS1	Analyses of modelled heat transport variability in coupled climate models	Dr. Eric van der Swaluw, dr. Sybren Drijfhout, dr. Wilco Hazeleger, KNMI
CS1	Analysis of internal wave observations, parametrization of diapycnal mixing	Dr. Louise Gostiaux, dr. Hans van Haren, Leo Maas, Theo Gerkema, NIOZ
CS1	Mixing in a high resolution Atlantic general circulation model	Dr. Peter-Jan van Leeuwen, dr. Olwijn Leeuwenburgh, IMAU
CS2	Quantification of the direct aerosol effect for the Netherlands	Dr. Wouer Knap, dr. Alexander Los, KNMI
CS2	Aerosol monitoring	Prof.dr. Gerrit de Leeuw, TNO, Bas Hentzing, Wageningen UR
CS2	A study of boundary clouds and drizzle	Christine Brandau, TU Delft
CS2 / ME2	Regional scale energy fluxes and the structure of the boundary layer at CESAR	Dr. Fred Bosveld, dr. Reinder Ronda, KNMI, dr. Herman Russchenberg, TU Delft, Arnoud Apituley, RIVM, dr. Arnold Moene, Wageningen UR
CS2	Tower-based high resolution rainfall radar	Jordi Figueras, dr. Herman Russchenberg, TU Delft
CS2	The development of a Raman lidar for the diurnal observation of clouds, aerosol and water vapor profiles and boundary layer structures	Arnoud Apituley, dr. Keith Wilson, RIVM
CS2	Observation and parameterization of the hydrological component of land surface - atmosphere interaction	Dr. Remco Uijlenhoet, Hidde Leijnse, Remko van der Beek, Han Stricker, Wageningen UR
CS2	Monitoring of ice clouds with radar and lidar to document geometrical and microphysical properties	Dave Donovan, Gerard-Jan van Zadelhoff, KNMI
CS2	A study of mixed-phase clouds	Yann Dufournet, TU Delft
CS3	Representation of soil moisture and root water uptake in climate models	Dr. Jos van Dam, Wageningen UR
CS4	The regional climate impact of aerosols	Dr. Harry ten Brink, ECN, dr. Reinout Boers, KNMI, dr. Renkse Timmermans, TNO
CS4	Sensitivity of cloud albedo to differences in CCN parameterizations	Dr. Gabriella de Martino, dr. Reinout Boers, KNMI, dr. Martin Schaap, TNO, dr. Harry ten Brink, ECN
CS4	Aerosol distributions over Europe from the chemistry transport model LOTOS-EUROS	Dr. Renske Timmermans, dr. Bram Bregman, dr. Martijn Schaap, TNO
CS4	The importance of ammonium-nitrate aerosols as regional CCN agent	Dr. Harry ten Brink, Rene Otjes, Piet Jongejan, Gerard Kos, ECN
CS4	A large cloud chamber to monitor the cloud-activation of ammonium-nitrate and ammonium-sulphate aerosol	Dr. Harry ten Brink, Piet Jongejan, Gerard Kos, ECN
CS5	Remote influences on European climate	Dr. Frank Selten, KNMI
CS6	Refinement and application of a regional atmospheric model for climate scenario calculations of Western Europe	Dr. Erik van Meijgaard, Stephan de Roode, dr. Bert van Ulf, KNMI
CS6	Status of present-day and future climate integrations with the regional atmospheric model RACMO	Dr. Erik van Meijgaard, KNMI
CS6	The representation of vertical turbulent transport by boundary-layer clouds; Results from a combined-massflux-turbulent kinetic energy approach	Stephan de Roode, KNMI
CS7	Tailoring climate information	Dr. Janette Bessembinder, prof.dr. Bart van den Hurk, Alexander Bakker, KNMI
CS7	Examples of tailoring climate information	Dr. Janette Bessembinder, prof.dr. Bart van den Hurk, Alexander Bakker, KNMI
CS7	Transformation of historical time series into future time series	Alexander Bakker, dr. Janette Bessembinder, KNMI
CS7	Can we develop 'standard' years for the future?	Alexander Bakker, Timo Kroon, dr. Janette Bessembinder, KNMI





CS7	Wind energy in a changing climate	Alexander Bakker, Henk van den Brink, Jan Coelingh, KMMI
CS8	Time series information	Dr. Theo Brandsma, KNMI
CS9	Modelling and reconstructing precipitation and flood frequency in the Meuse catchment during the late Holocene	Prof.dr. Jef Vandenberghe, Vrije Universiteit c.s.
CS9	The chemistry of freshwater mussels as a proxy for late holocene river conditions	Emma Versteegh, Vrije Universiteit
CS9	Climatic induced changes in vegetation and river dynamics during the subboreal of the Meuse system (Limburg, the Netherlands)	Dr. Frans Bunnik, TNO
CS9	Increased recent and late Holocene discharge and flood frequency of the river Meuse: effects of climate change versus land use change	MSc. Philip Ward, Vrije Universiteit
CS9	Precipitation and surface hydrology in the Meuse catchment for the period 4000-2500 BP: Reconstructions based on isotopic ratio's in peat bogs	Aafke Brader, Vrije Universiteit
IC2	Integral analysis of mitigation options within sectors and regions	Elke Stehfast, MNP
IC3	Localising the land use impact of global change	Noor van der Hoeven, Vrije Universiteit
IC3	Review of flood hazard maps in Europe	Hans de Moel, Vrije Universiteit
IC5	Cost-Benefit analysis of adaptation and mitigation options for climate change: methods and applications	Prof.dr. E.C. van Ierland, Wageningen UR
IC5	Stated preference approaches to the valuation of flood risks: VOSL and other indicators	Dr. Marija Bockarjova, Vrije Universiteit
IC5	Integrate modelling for cost-benefit analysis and land use	Karianne de Bruin, Wageningen UR
IC8	PRObing a method to facilitate the interactive linking of expert knowledge to stakeholder assessment	Dr. Matthijs Hisschemöller, Vrije Universiteit
IC10	Framing climate change and climate proofing: From awareness to action	Dr. Joop de Boer, Vrije Universiteit
IC11	Socio-economic scenarios for climate change assessments	Prof.dr. Frans Berkhout, Vrije Universiteit
IC12	Institutions for adaptation: Is the Dutch institutional structure capable of adapting to climate change?	Prof.dr. Joyeeta Gupta, Vrije Universiteit, prof.dr. Katrien Termeer, dr. Judith Klostermann, Wageningen UR, dr. Sander Meijerink, Margo van den Brink, Radboud University dr. Pieter Jong, TU Delft, Sibout Nooteboom, DHV
ME1	Integrated observation and modelling of green house gas budgets at the ecosystem level	Eddy Moors et al., Wageningen UR
ME1	Variability of annual CO <sub>2</sub> exchange from Dutch grasslands	Dr. Cor Jacobs et al., Wageningen UR
ME1	Application depth and timing of manure and crop residues as a driver for N <sub>2</sub> O emission variability	Dr. Jan Willem van Groenigen, dr. Peter Kuikman, dr. Gerard Velthof, Wageningen UR
ME1	Soil profile dynamics and indirect emissions of N <sub>2</sub> O on a managed peat soil; equipment development and preliminary results	Dr. Jan Willem van Groenigen, Eduard Hummelink, dr. Peter Kuikman, Wageningen UR
ME1	Spatial and temporal variability of greenhouse gas fluxes in two managed peat areas	Ariana Schrier-Uijl, Elmar Veenendaal, prof.dr. Frank Berendse, Wageningen UR
ME1	Micrometeorological observations of CH <sub>4</sub> and N <sub>2</sub> O at a managed fen meadow in the Netherlands	P. Kroon et al., ECN
ME1	Evaluation of satellite derived and DGVM surface soil moisture products	Karin Rebel, R. de Jeu, P. Ciais, prof.dr. Han Dolman, N. Viovy, S. Piao, N. de Noblet-Ducoudré Vrije Universiteit
ME1	Effects of spatial variation in land cover on N <sub>2</sub> O emission of Dutch fen meadow systems	Linda Nol, Peter H. Verburg, Gerard B.M. Heuvelink, Wageningen UR
ME1	The full greenhouse gas balance of an abandoned peat meadow	Dimmie Hendriks, Ko van Huissteden, prof.dr. Han Dolman, Michiel van der Molen, Vrije Universiteit
ME2	The importance of representation errors in inverse modelling over the continent	Lieslotte Tolk, Vrije Universiteit
ME2	Investigating atmospheric boundary layer dynamics using a national network of scintillometers, ceilometers and the meso-scale model WRF	Gert-Jan Steeneveld, Arnold Moene, Oscar Hartogensis, Bert Holtslag, Wageningen UR, Henk Klein-Baltink, KNMI
ME3	Soil carbon dynamics and variability at the landscape level: its relation to aspects of spatial distribution in	Nynke Schulp et al., Wageningen UR / MNP



	national emissions databases	
ME4	An integrated framework to assess spatial and related implications of increased implementation of biomass delivery chains - project overview	Prof.dr. Johan Sanders, dr. Bert Annevelink, Wageningen UR
ME4	European biomass resource potential and related costs	Marc de Wit, University of Utrecht
ME4	Spatial, environmental and socio-economic impacts of regional biomass delivery chains	Floor van der Hilst, University of Utrecht
ME5	The effect of spatial arrangement of wetlands on water quality improvement	Dr. Jan Vermaat, Vrije Universiteit
ME6	Spatial decision support for participative management of Dutch fen meadows	Dr. Ron Janssen, Vrije Universiteit

