INTERNATIONAL SCIENTIFIC EVALUATION OF PBL 2008-2012

REPORT FROM THE INTERNATIONAL PBL AUDIT COMMITTEE

FEBRUARY 2013

PREFACE

This report is the result of an international scientific audit of PBL that took place at the request of PBL's Advisory Board between August and December 2012. It is part of the external quality control of the Agency. The Audit Committee of eight international experts was asked to judge the quality of PBL products and activities, taking into consideration PBL's mission to conduct policy-relevant research and work on the interface of science and policy.

Overall, our assessment of PBL iss very positive. PBL has developed a strong strategy, but its implementation needs new expertise. We strongly recommend that the Government takes this into account when making budget decisions regarding PBL.

It was an honour to chair the panel and a privilege to work with such distinguished and committed colleagues. Their independent and perceptive judgements form the basis of this report, which represents our common view on conclusions and recommendations. We received excellent support from our rapporteur Dr Femke Merkx, who assisted us in organising the outcome of our work and compiled the report based on inputs of the Committee.

On behalf of the Audit Committee I wish to express our gratitude to the staff of the PBL and particularly to Professor Arthur Petersen, Mr Bert de Wit, Ms Simone Poldermans and Ms Inge Jansen for their inputs to and assistance during the audit.

The Committee hopes the results of this audit will help PBL to further improve its important work and to make appropriate choices for the future.

Lea Kauppi

Chair of the Audit Committee

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STRATEGIC CHOICES

The Committee was asked to provide feedback on PBL's strategic plan.

- While the Committee expressed some concerns and made some additional suggestions, it found that overall PBL has made effective strategic choices that are based on a sound analysis of PBL's strengths, its role as policy advisor, and the changing societal environment in which PBL operates.

  In particular the Committee endorses PBL's choice to:

  - focus more on studies that integrate across disciplines and sectors;
  - increase attention to governance and policy implementation;
  - increase stakeholder participation in research design and analysis;
  - reduce the number of sector policy assessments, no longer develop sector models and no longer contribute to monitoring.

HORIZONTAL THEMES

The Committee was asked to reflect on a number of questions relating to the science-policy-society interface; scientific quality control; and organization and human resources. The Committee decided to assess strengths and weaknesses for each of these horizontal themes and to formulate recommendations.

SCIENCE-POLICY-SOCIETY INTERACTIONS

Strengths

- The Committee was impressed by PBL's thoughtful and well-considered mix of roles at the science-policy interface. The way PBL is positioned and functions at the science-policy interface is setting an international benchmark.

- The Committee was pleased to see that PBL is committed to its independence. PBL plays a proactive role in the agenda setting discussions with the Ministries. The Committee recommends that PBL should continue to do so in the future.

- PBL is increasing attention to policy implementation and governance in its analyses, which further improves the societal impact of PBL's work.

- PBL has adopted state-of-the-art guidelines on uncertainty characterization and stakeholder participation. These are essential for use of uncertain information in decision making and help ensure that PBL's approaches are transparent.

Weaknesses and Recommendations

- The understanding of PBL's role in interactions with policy and society shows varying degrees of sophistication across PBL. The Committee recommends that PBL should continue to develop among its staff a clear and conscious understanding of research on science-society-policy relations and the ways in which this research can be reflected in PBL's interactions with policy and society.

- PBL studies issues that transcend different geographical scales and multiple policy levels. It needs to address these issues as multi-scale problems to make sure that comprehensive analyses result and effective solutions, strategies or policies are proposed. It is not so clear if and how PBL is doing this. The Committee recommends that PBL should provide more clarity about how it intends to work across scales, especially given the counteracting forces of policy decentralization and budgetary constraints that limit the level of PBL's activities at regional and local levels.

- PBL has adopted a leadership role in conceptualizing science-policy-society interactions, but does not necessarily have the means and resources to bring its vision into full-scale practice. The Committee strongly endorses PBL's intention as stated in the Communication Strategy 2012-2015 to increase the use of (new) communicative techniques. Furthermore, PBL is recommended to continue to improve its two-way communication with all parts of society, including more engagement with the private sector.

Scientific Quality Control

Strengths

- PBL has a good understanding of what constitutes scientific quality in the context of independent policy advice.

- For high-visibility publications there is an extensive internal review procedure, at different stages throughout the research project.

- PBL has extensive guidelines and procedures for checking external data that seem to work well.

- The recruitment of a Chief Scientist is a sign that scientific quality control receives serious attention within PBL.

Weaknesses and recommendations

- Procedures for scientific quality control vary among PBL departments and there is no uniform policy on external reviews. In addition, internal review procedures (e.g., seminars) do not always meet the expectations of a critical review. The Committee recommends considering a more rigorous, standardized review procedure and that the procedures used and the content of the review be carefully documented in the projects.

- The number of peer-reviewed journal publications varies widely among sectors, researchers and projects. The Committee recommends that significant results and methodological advances be disseminated in peer reviewed journals. Adequate time and incentives should be offered for such work.

- The role of the Chief Scientist is still unclear to many staff members. The Committee recommends that PBL management explains better to researchers the role of the Chief Scientist and how to interact with him/her.

- The allocation of responsibilities for scientific quality control may not be optimally effective. The Committee recommends reconsidering the responsibilities and tasks of the Chief Scientist as well as the possible need for a Scientific Director.

- In times of a shrinking budget and changing strategic priorities there is a risk that long term strategic research will be given lower priority. The Committee recommends maintaining PBL's current level of investment in strategic research.

ORGANIZATION AND HUMAN RESOURCES

Strengths

- PBL has a motivated and skilled staff and a positive work culture.

- To cope with a shrinking budget, PBL has chosen a dynamic reorganisation process to reduce staff, without compulsory redundancies.

- PBL's critical self-evaluation reflects the aim of being a learning organization.

- The PBL Academy and other internal education provide a useful means of refreshing staff capacity and extending expertise in needed directions.

Weaknesses and Recommendations

- The Committee is concerned about the mix of expertise and skills within PBL. It does not seem to be adequate for achieving the strategic choices. Because of budget cuts there will be little opportunity to hire new people. Training and education will not be enough to solve this problem. The Committee recommends preparing a human resource strategy to support the implementation of the strategic choices. This strategy should be accompanied by a concrete plan to realize the actions needed, along with a monitoring plan.

- PBL should consider seeking more external funding while the Ministry should abolish funding rules that form a disincentive for obtaining external funding (i.e. they should allow PBL to carry over external funds from one budget year to the next).

- Within PBL there is no explicit attention to facilitation skills. The Committee recommends that PBL build staff capacity in such skills to support interdisciplinary collaboration and stakeholder participation.

EVALUATION OF SCIENTIFIC QUALITY AND SOCIETAL AND POLICY RELEVANCE BASED ON THE SELECTED PROJECTS

The Committee has reviewed eight PBL projects. Based on this review and the self-evaluation material provided by PBL the Committee arrives at the following conclusions:

- While the Committee observed some variation in scientific quality and made recommendations for further improvement, our overall impression of the scientific quality of PBL's work is very positive.

- In three of the projects assessed there was little or no reference to uncertainty. At the same time the Committee noted that PBL provides state-of-the-art guidelines for uncertainty characterization and communication. The awareness and implementation of these guidelines within PBL needs to be improved.

- The Committee concludes that while some good examples of governance expertise are available within PBL, this kind of expertise is not yet broadly applied throughout all of PBL's work.

- Overall, the projects that have been assessed are highly relevant, both for policy and for society at large. Furthermore, the quality of science-policy-society interactions is very good.

1. INTRODUCTION

The PBL Netherlands Environmental Assessment Agency is the Dutch national institute for strategic policy analysis in the fields of the environment, nature and spatial planning. PBL reports and advice contribute to policy preparation, political discussions and the public debate in the Netherlands.

This report is the result of an international scientific audit of PBL that took place at the request of PBL's Advisory Board. It is part of the external quality control of the Agency. The Audit Committee was asked to judge the quality of PBL products and activities, taking into consideration PBL's mission to conduct policy-relevant research.

The composition of the Committee was as follows:

- Prof. Lea Kauppi (chair)
- Prof. Jeroen van den Bergh
- Prof. Leen Hordijk
- Prof. emer. Judith Innes
- Prof. Sheila Jasanoff
- Dr. Pushpam Kumar
- Prof. Wolfgang Lutz
- Dr. Richard Moss

A brief profile of the Committee members is included in Annex A.

In addition to assessing the quality of PBL's work, the Audit Committee was asked to provide feedback and advice on a number of specific questions identified by PBL and to comment upon PBL's future strategy. The Committee appreciates the fact that PBL was willing to share its views and doubts and to take the audit as an opportunity to learn. This attitude is needed, particularly now that PBL is facing significant budget cuts and is forced to reassess its priorities.

TERMS OF REFERENCE

The goal of the 2012 audit was to evaluate the quality and relevance of the research that is conducted by PBL from an international perspective. The Audit Committee was asked to produce an evaluation report, indicating what has been going well and what could be done better with regard to the quality and relevance of the research conducted by PBL. The Committee was allowed to make recommendations with regard to improvements to the research, its relevance, PBL management and its positioning in the future. The Committee could further identify actions to be taken to promote an internationally prominent role of PBL.

Although the evaluation covers the period from May 2008 to May 2012, the focus is on 2011 and 2012. Following the merger in 2008 it was not until 2010 that new departments were established and employees were settled in the new organisation. Moreover, most of the material

that was available for the self-evaluation report concerns PBL activities and publications from the last two years.

PROCEDURE

Providing policymakers with policy-relevant knowledge forms the core of PBL's mission as a research institute. For two reasons the approach that is normally applied in evaluating university research is not adequate in this case. First, the quality of PBL's work is not restricted to what normally counts as scientific quality, such as the quality of underlying data, the underpinning of the conclusions and the quality of the models and the methods used. In the case of PBL, quality also includes addressing issues of policy and societal relevance, framing of research questions, appropriate timing of projects, and choosing appropriate ways of communicating results. In addition, not all of PBL's work is suited for publishing in academic peer-reviewed journals. In order to be publishable, it is not enough for research to be scientifically sound, it also needs to be novel. However, not all of PBL's work is intended to be novel. It is therefore clear that the evaluation of the quality of PBL's work cannot be limited to scientific quality as attested by peer-reviewed publications or other academic indicators (e.g., part-time university positions of PBL researchers).

The evaluation approach chosen by the Committee consists of two main parts. First, the Committee made an in-depth evaluation of eight PBL projects. These projects were selected out of a longer list of 15 projects that was provided by PBL as a representative[1] sample of PBL's work. All the departments of PBL were represented in this selection of projects and the diversity of activities and some flagship products were highlighted. Second, the Committee decided to assess three cross-cutting or horizontal themes. These were 1) the science-policy-society interface; 2) scientific quality control; and 3) organization and human resources. These themes were chosen to cover most of the questions that PBL put forward in the self-evaluation report. Furthermore the themes cover the crucial factors for the successful performance of the Agency.

Before the visit to PBL the Committee received detailed reports of the eight projects, describing the aims of each project, the way it was carried out, the methods that were used, an indication of its societal/policy relevance and reception by policy-makers and others, and information on if and how the project results were published or presented to the scientific community. The Committee also received the self-evaluation report that presented the main organizational numbers, PBL's strategic choices, procedures for scientific quality control, collaboration partners, target audiences and stakeholders, PBL's work programmes, and an overview of activities and results. Additional material was provided on request.

The Committee visited PBL November 12-16, 2012. It had prepared an extensive program of interviews, with the Advisory Board, PBL's general management and Chief Scientist, representatives of the Dutch Ministries, representatives of research institutes that collaborate

[1] The Committee had no means to assess whether this sample was indeed representative. And although the Committee had no reason to think that it was not, for future scientific audits it is recommended to keep a record of internal and external review procedures. That would give the Committee an additional source of information to assess scientific quality and its control (see also the chapter on Scientific Quality Control).

with PBL, and members of PBL staff (including Department Heads, the Works Council, the PBL's Office of Communication and Management Support). The eight projects were discussed in separate meetings with the researchers involved. For an overview of the programme of the site visit see Annex B.

At the end of the site visit the Committee shared its preliminary findings with the Advisory board and with PBL's management team and Chief Scientist.

Before, during and after the site visit the Committee was assisted by an independent secretary Dr.ir. Femke Merkx ('Kenniscocreatie, onderzoek & advies'). She helped the Committee in preparing and structuring the evaluation and assisted in writing the evaluation report.

STRUCTURE OF THIS REPORT

After the introduction, the second chapter discusses PBL's strategic choices for the future. Chapters three, four and five present strengths, weaknesses and recommendations on the themes of 'the science-policy-society interface', 'scientific quality control' and 'organization and human resources'. Chapter six contains the elaborate reviews on the assessed projects and provides overall conclusions and lessons on scientific quality and societal and policy relevance.

2. ASSESSMENT OF STRATEGIC CHOICES

The Committee was asked to give its opinion on the choices made in PBL's Provisional Strategic Plan, the Charcoal Sketch. The Committee concluded the following:

- **Overall PBL has made effective strategic choices that are based on a sound analysis of PBL's strengths, its role as policy advisor, and the changing societal environment in which PBL operates.**

In particular, the Committee endorses PBL's choices to:

- Focus more on studies that integrate across disciplines and sectors.

Today's major problems are all interlinked. Thus in order to be able to provide relevant policy advice, an integrating approach is necessary. Such an approach aims to inform policymakers about all the relevant aspects and trade-offs and provides some warrant against suboptimal decision making. Furthermore integrated studies are the core of PBL's national and international reputation.

- Increase attention to governance and policy implementation.

PBL will not only produce policy analyses, but it will also increasingly aim to identify new policy perspectives. For the relevance of policy advice one important question is on which level policy intervention would be most effective. Sustainability issues can only be tackled through understanding the roles of different institutions (including markets) and changing behaviour. This has to be properly taken into account to improve the effectiveness of policy analysis and minimize unintended, negative side effects.

- Increase stakeholder participation in research design and analysis.

Stakeholder participation serves three objectives: 1) to better understand the different problem perceptions and framings that exist among stakeholders; 2) to make use of relevant local and practical knowledge; and 3) to improve the adoption and impact of PBL analyses and advice.

- Reduce the number of sector policy assessments, no longer develop sector models and no longer contribute to monitoring.

In a time of budget cuts, it makes sense to focus on PBL's ability to integrate across sectors and to leave within-sector activities to others.

Regarding the following three strategic choices the Committee wants to share some concerns and reflections:

- PBL will prioritise studying issues that are unstructured – new issues that form a challenge to policy makers.

The Committee acknowledges the importance of prioritizing unstructured issues, but considers this a very challenging task that requires multiple kinds of expertise and thus needs to be conducted through close collaboration with other organizations.

- PBL will limit activities within the European framework to climate and energy, food and biodiversity and resource efficiency.

Under shrinking budgets it is necessary to prioritize certain themes in the European framework. However, almost all environmental legislation is nowadays decided on at the EU level. Therefore it is in the interest of the Dutch government for PBL to be involved in the development of relevant European environmental legislation. The Committee sees ample opportunities for EU funding for the topics in which PBL is strong. The Committee recommends that PBL put more effort in targeted acquisition of EU funds.

- With regard to the on-going decentralisation policy in the Netherlands, PBL will focus its work on the overall national system, reflecting its mandate to serve the national government.

The budget cuts make it difficult for PBL to play a strong role in the decentralisation of policy. In the future, PBL will only study local cases when it helps in solving a national policy problem or when the national government needs support. The national government has asked PBL to support the ministries in making knowledge accessible for local authorities. In cases where local developments affect national policies, PBL will be open to studying phenomena at the local level. However, in general, the regional level will be the lowest geographical level for PBL studies.

The Committee understands that it is not in the mandate of PBL to support local authorities in resolving their individual and unique problems. However, given the premise of the "Energetic Society" report and because of policy decentralization solving national problems will increasingly involve trends, interactions, and dynamics at local scales. Therefore the Committee recommends carefully balancing PBL's strategic choice to focus on the national scale with the need for research and assessment at regional, local, and even sub local scales.

The Committee had no time to discuss thoroughly whether some developments or subjects were missing in the provisional strategic plan. However, the following subjects were brought up for consideration:

- the role and context of the financial-economic crisis;
- a strategy for intensifying PBL's collaboration with universities and institutes in the Netherlands and abroad;
- the assimilation of data from different sources, e.g. satellite data and crowd sourcing;
- communication with policy makers, stakeholders and target audiences.

Finally, the Committee observed that awareness of the strategic priorities at different levels within PBL is limited. Better communication from the upper management levels to the research staff is needed.

3. SCIENCE-POLICY-SOCIETY INTERFACE

STRENGTHS

- **The Committee was impressed by PBL's thoughtful and well-considered mix of roles at the science-policy interface. The way PBL is positioned and functions at the science-policy interface is setting an international benchmark.**

The Committee was pleased to see that PBL takes a broad view of its role at the science-policy interface. PBL considers policy relevance to be as important as scientific quality. By frequently interacting with policy makers and other stakeholders PBL ensures that its advisory work is relevant for policy. These interactions have the character of a two-way dialogue. Under the present directorship, PBL formulates its yearly work programme in an interactive and integrative dialogue with all relevant Ministries. Earlier, the knowledge agendas of the various Ministries were not coordinated with one another and agenda setting was more of a one-way process. The Ministries consider the present procedure a considerable improvement. PBL's expertise is now used to inform the agenda-setting process.

PBL also engages with stakeholders and the public in an interactive manner. The Energetic Society report provides conceptual foundations for such efforts. Implementation of these ideas can be seen in various other reports, for example the Nature Outlook 2010-2040, the Ex-Durante Evaluation of the Spatial Planning Act and Roads from Rio+20, and in the recent launch of www.climatedialogue.org.

- **The Committee was pleased to see that PBL is committed to its independence. PBL plays a proactive role in the agenda setting discussions with the Ministries. The Committee recommends that PBL should continue to do so in the future.**

Independence is highly valued by PBL. Independence in agenda setting is assured both by PBL's legal position and its power to identify its own research questions and give unsolicited advice.[2] There is no indication of interference by the Ministries with the writing and publication of PBL reports. Indeed, Parliament, to some extent, can act as a counter-force by demanding a Ministerial response to PBL reports and can also ask PBL for advice.

As a provider of information for policy making PBL plays an important role in identifying what knowledge is relevant in order to answer policy makers' questions, how to acquire and assess information and present it effectively. Independence for this purpose includes freedom from stakeholder interests. In this role PBL can also reframe issues if they have been poorly formulated by the policy system, and select methods that are appropriate.

[2] 60% of PBL's budget is spent on policy analyses specified in the yearly work programme; of this 60% one fifth is spent on legally required reports. 20% of the budget is spent on strategic research and 20% is reserved for ad hoc questions. The yearly work programme is drafted in consultation with the Ministries, which put forward important policy themes as guiding themes for PBL research. PBL also has room to set the agenda. Ultimately, it is the PBL Director who decides on the definite content of the work programme.

With regard to independence in information provision, see our recommendations concerning scientific quality.

- **PBL has explicitly incorporated concerns for implementation and governance into its activities.**

These choices allow PBL to bring normative considerations into the debate while still acting within its mission to be scientifically sound and independent (i.e., not partisan to a specific normative or political position). One of PBL's roles is giving strategic advice. In this role PBL challenges policy makers to think in a more strategic way about policy issues. For example, the Energetic Society report urges policy makers to rethink the meaning of governance in the context of "a society of articulate citizens, with an unprecedented reaction speed, learning ability and creativity". This rejects the discredited "deficit model" of public understanding of science and sets new foundations for participation and engagement. As some comments of users of PBL's work attest, policy makers particularly appreciate this kind of analysis for its ability to make them think in new and productive ways. Importantly, PBL recognizes that stopping the analysis at the 'what' questions will leave policymakers with an important gap regarding how to achieve different objectives. This increased attention to governance aspects (e.g., steering, behaviour) is extremely important and strongly endorsed by the Committee.

PBL's proactive role in reframing policy debates is another of its strengths. In the specific case of the Nature Outlook 2010-2040, PBL sought to change a policy-analytic approach that had become incomprehensible to policy makers and the public, making it difficult to get acceptance. PBL involved a broad range of stakeholders to develop a new way of thinking about human-nature interactions. Stakeholder input and formal modelling were integrated into normative scenarios to explore desired and plausible futures. An innovative and inclusive process of public consultation led to a report that laid out four simplified approaches to valuing nature. The resulting approach to scenario analysis should permit a more transparent and politically acceptable accounting of costs and benefits of alternative environmental futures.

- **PBL has adopted state-of-the-art guidelines on uncertainty characterization and stakeholder participation.**

These guidelines are essential for use of uncertain information in decision making and help ensure that PBL's approaches are transparent. They also provide a basis for consistency of practices across the many issues and topics on which PBL is asked to provide expertise.

WEAKNESSES AND RECOMMENDATIONS

- **The understanding of PBL's role in interactions with policy and society varies across PBL and shows varying degrees of sophistication.**

In talking with members of PBL's research staff the Committee observed differences in the understanding of PBL's role in interaction with policy and society. Differences exist across different levels of hierarchy as well as between departments in PBL. Some researchers subscribe to the notion of 'speaking truth to power', without seeming to realize that policy framings are

always normative, and that 'independence' in the case of PBL may involve taking into account the beliefs of different societal stakeholders—even those regarded as marginal by some scientists. The Committee found an admirable openness to the idea of broad public participation across PBL. It was not clear from the conversations, however, that the majority of staff is familiar with the latest scholarship on relations between science, society, and politics and thus know how best to factor public beliefs and perceptions into PBL assessments, including re-examining PBL's own assumptions.

The Committee recommends that PBL should continue to develop across all departments and levels of hierarchy within PBL a clear and self-conscious understanding of basic research on science-society-policy relations and the ways in which this research can be reflected in PBL's interactions with policy and society.

- **There is a lack of clarity about working across geographical scales and multiple policy levels.**

PBL works more and more in a multilevel governance setting. National government has been and will continue to be important, both in the demands it places on PBL and in its role in implementing policy. However, especially in the domains of environmental policy and its relationship to spatial planning, there are other influences and levels of governance that are increasingly important. On the one hand, Europeanization and globalization have strong impact on Dutch society and on implementation of policies. On the other hand, given the trend in Dutch government towards decentralization and 'localization', analysis at this lower level will also remain extremely important, particularly from a governance perspective. While as an institute PBL is positioned at the national policy level, the issues of concern that are studied by PBL will require research and intervention on these multiple scales ((urban)regional, national, European and international). PBL carries out studies on all these levels, but it is not so clear if and how these studies are linked. Rethinking problems as multi-scale problems requires more attention to conceptual and methodological issues such as sources and validity of regional data or linking models at multiple scales.

Another issue that surfaced during our evaluation was the possibility of conflicts when doing studies for different policy levels (for example, conflicts between the European and national level, or between national and regional or local scales). Conflict might arise, for instance, in relation to confidentiality of research results; or if analyses of related issues for different clients arrive at different conclusions; or if a conclusion meets ready acceptance at one level and resistance at another. The Committee considers these problems of serving two masters as unavoidable. It would not recommend confining studies to the national policy level. However, when working for different policy levels, consistency in the recommendations across levels is important.

The Committee recommends that PBL provide more clarity about how it intends to work across scales.

In the self-evaluation report, PBL signalled that it would do less work at scales below the national level, and this may be a necessary prioritization of effort given budget constraints. However, if PBL is to meaningfully address governance and implementation issues (and provide assessment that builds on the analysis contained in *The Energetic Society*), it will need to find an

approach that enables it to link across scales and to focus – perhaps through case studies that are relevant to a number of regional or local governments or institutions – on relevant trends and actors at regional and local scales. When addressing problems as multi-scale problems, one potential approach is to encourage more vigorous cross-fertilization among staff working on similar issues at international, national, regional and local levels.

- **PBL has adopted a leadership role in conceptualizing science-policy-society interactions, but does not necessarily have the means and resources to bring this into full-scale practice.**

In discussion with the Committee, "communication" was primarily presented as a challenge for the communication specialists within the Office of Communication and Management Support (a group of approximately 15 people). This includes Dutch, English and internet editors, public affairs specialists and library specialists. This team has the responsibility of supporting project teams in a number of ways, including planning standard communication products (reports, press releases, and the like). In addition, the communication team supports the project teams as they develop approaches for stakeholder dialogue and user communication during research projects. The Committee supports a strong involvement of the Office of Communication and Management Support.

Although there are a few exceptions, like the Rio+20 'app'[3] and the recently launched website for exploring different views on climate change (www.climatedialogue.org), PBL is not at the forefront of applying new forms of (digital) communicative techniques.

To increase public trust in PBL's work, transparency and open access to data, models and methods is only half the answer. Addressing potentially controversial issues requires two-way communication about the basis of competing viewpoints. PBL has adopted this approach for example in the Nature Outlook 2010-2040, but lacks the resources to engage consistently in such exercises.

Currently, communication at PBL is most strongly focused on politicians and policymakers. According to the vision expressed in the Energetic Society, PBL should communicate more with civil society and the private sector. The Committee does not consider that PBL has the resources to conduct this expanded dialogue.

The Committee strongly endorses PBL's intention as stated in the Communication Strategy 2012-2015 to increase the use of (new)communicative techniques. Furthermore PBL should continue to improve its two-way communication with all parts of society, including more engagement with the private sector.

In particular the Committee recommends increasing the use of info graphics, social media and innovative interactive techniques, such as playing with models in a context of decision-making support. For example, in many countries, "participatory scenario planning" is becoming more common as an approach for communicating assessment findings in ways that encourage users of the assessments to bring knowledge into deliberative processes for on-going questions or decisions they are confronting. A participatory process is a purposefully designed set of

[3] This is a smart phone and tablet friendly web application which gives the interested reader a chance to dive deeper into the report, watch clips from the documentary or share interesting content via social media.

activities that can include workshops and engagement of participants through other means such as decision theatres. These processes can use assessment and model results in ways that enable participants to evaluate how local decision options may be affected by broader changes. They employ a range of visual and spatial media derived from modelling, data, scenarios, and other sources, and portray this information using specialized three-dimensional modelling software or widely available virtual globe platforms (e.g., *Google Earth*). While recognizing that such approaches are resource intensive, we would encourage PBL to explore their application to the extent possible. While producing and releasing reports in standard formats is more familiar and easier, there are scientifically sound approaches for more actively engaging stakeholders and increasing the credibility, salience, and usability of scientific information.

Beyond this, we encourage PBL to improve transparency of and access to all data and models used in preparation of its reports, and to use social media, visualization, and other approaches to make this information available and accessible to users.

4. SCIENTIFIC QUALITY CONTROL

STRENGTHS

- **PBL has a good understanding of what constitutes scientific quality in the context of independent policy advice.**

PBL's policy document on scientific quality control[4] mentions four aspects of scientific quality:

1. The quality of the process through which products are created;
2. The statistical reliability (the quality of statistical information about uncertainties);
3. Methodological reliability of assumptions and quality of argumentation. This includes the question of whether relevant societal developments are well reflected in the formulation of the research question and in the framing of the problem (as a whole the quality of the scientific foundations);
4. The quality of the presentation.

The way PBL defines scientific quality is highly appropriate for its position at the interface between science and policy. The policy document on scientific quality control gives the impression that quality of research is seriously guided and monitored. The suggested actions for improvement for 2011-2012 are good, both in content and the formulation of actions by concrete actors within PBL.

- **For high-visibility publications there is an extensive internal review procedure, at different stages throughout the research project.**

For a number of twenty so-called high-visibility-publications there is an extensive internal review procedure. These publications require approval by the Director and the head of communications. For other types of publications Department Heads have final responsibility. In addition, seminars are organised on three occasions during the course of high-visibility-projects: at the start, midway and at the end of the project. These seminars are intended to provide colleagues – and possibly also people from outside PBL – with the opportunity to critically examine project plans, on-going work and project results. The seminars procedure was originally meant for all PBL projects, but now is only obligatory for the high-visibility projects. It is still recommended for other projects.

- **The recruitment of a Chief Scientist is a sign that scientific quality control receives serious attention within PBL.**

Since 2011, PBL has a Chief Scientist (for 0.4 FTEs), whose special assignment is to see whether procedures and standards that have been formulated for quality control function well or need to be adapted. He also facilitates internal and external discussions on contentious scientific issues and on different scientific views and methodologies. Although there is still little experience with his role, the audit Committee heard positive statements about it. Members of the research staff

[4] Source: Beleid wetenschappelijke kwaliteitsborging planbureau voor de leefomgeving 2011-2012.

said that he is a trustworthy person who can be contacted for methodological questions. It was also said that he acts as an ambassador between the Director and research staff.

- **PBL has extensive guidelines and procedures for checking external data that seem to work well.**

In the talks with members of the research staff the Committee concluded that PBL takes this issue very seriously and does a good job in checking the data for plausibility and reliability.

- **The number of contested PBL studies is low.**

Within the period of review the Committee did not come across any PBL study that was contested. The PBL's meta-study on the quality of IPCC assessments dealt with the contested issue of climate change. But, while the topic was controversial the meta-study itself did not raise any debate. For more details, see the Committee's assessment of this study in chapter six.

- **Informal and formal internal communication seems to work well.**

Talking about work to colleagues is an important element of quality control as it means that several brains start thinking about the same issue. This can happen in formal supervisory talks as well as informally over coffee or lunch. The Committee got the impression that informal and formal internal communication works well within PBL.

WEAKNESSES AND RECOMMENDATIONS

- **Procedures for scientific quality control vary among departments and there is no uniform policy on external reviews.**

Responsibilities for scientific quality control are distributed among a number of people. Project leaders and Department Heads play an important role. On specific aspects others have responsibilities as well. For example, if it comes to the quality of presentation the Communications Department has a role, while regarding statistical reliability the Department of Information, Data and Methodology can be asked for a statistical check. For projects that do not count as high-visibility projects, Department Heads have end responsibility. There is no general policy on external reviews. The Committee concluded that review procedures are not standardized between departments, and that a serious review was not undertaken in all cases. Moreover, when asking about scientific review some researchers gave the impression that feedback from policy makers also counts as such. Finally, reviewers are selected by the project leader, so are not anonymous and are not necessarily the most critical readers.

The Committee recommends considering a more rigorous, standardized review procedure.

The Committee has been informed that a PBL-wide standard for the external review procedure is planned and that the Chief Scientist is responsible for making this standard. The Committee feels that this should be treated with some priority and that this should also include the internal review procedure. A standardized review procedure has the advantage that no improvisation is needed, and that no mistakes are made if for some reasons, notably time pressure and "group

think", a serious review is avoided. Issues that deserve attention are: anonymity of reviewers to the project leader, number of reviewers asked, what counts as a scientific review (as opposed to feedback from policy makers), and a centralized versus decentralized approach. By combining the experiences and lessons from review procedures followed in the different departments in the past, it is likely that a better review process can be designed for the institute as a whole.

At present project leaders (in consultation with the Department Head) are responsible for organizing the internal and/or external review. The Committee suggests that PBL should rethink this and consider a more centralized organization of the review process in which project leaders are asked to provide suggestions for potential reviewers, whereas the review procedure and actual reviewers itself are decided about by a neutral, central person.

- **PBL researchers reserve little time for internal review and seminars do not always meet the expectations of a critical review.**

The self-evaluation report signals a problem with regard to internal review. It is stated that "in practice, researchers are often too busy in projects and have little time to spare to review the quality of the products of colleagues. Systematic feedback of what has been done with comments and suggestions is not always given." The self-evaluation report furthermore states that experiences with seminars as a method of quality control vary, and they do not always meet the expectations of a critical examination.

The Committee recommends documentation of the review procedure.

It seems that the task of reviewing is not seen as one of high priority and importance within PBL and that a change of organizational culture is needed. Management should better communicate the importance of reviewing, but communication alone might not be enough. The Audit Committee suggests that documentation of the review procedure might support the communicative message that reviewing is considered of central importance within PBL. Documentation should ideally apply to 1) the procedure itself; 2) the actual feedback and recommendations that were given; and 3) the way these were responded to in the publication. Furthermore, each publication should contain a statement on the review procedure that was followed. If for some reason it is decided to abstain from a standard review process, then this should be well argued, as this is likely to be noticed in a subsequent audit.

In addition, documentation of the review procedure serves four other goals as well:

a. Documentation and publication of reviewers' comments and responses to them, adds credibility in the eyes of users and other external audiences.

b. It helps the Chief Scientist to determine whether procedures and standards that have been formulated for quality control function well or need adaptation.

c. It can serve as one (of several) inputs for the Chief Scientist to determine where there is a need for training and courses.

d. It helps future Audit Committees in their task of assessing scientific quality.

In the case of PBL the assessment of scientific quality requires looking in detail into how, why and with what impact projects have been carried out. This is labour-intensive work which can only be done for a small part of the whole of PBL's work. The Audit Committee 2012 looked into eight projects. Records of review procedures could be an additional source of information here.

- **The number of peer-reviewed journal publications varies widely between departments, researchers and projects. Researchers indicate that there is not enough time for writing peer-reviewed journal publications.**

Though it has been suggested as official PBL policy to have at least one peer-reviewed journal article per project, this has not been decided and it does not appear to happen in practice. While some projects result in several such articles, others do not produce a single one. In the PBL document on scientific quality control it is suggested that the writing of policy reports can in many cases be concluded with a peer-reviewed journal publication. As PBL's core business is providing guidance to decision makers in a timely way, often such research does not lend itself easily to producing a peer reviewed publication because it lacks an important scientific innovation, or is too place and time specific. In addition, the effort and time needed to arrive from report to peer-reviewed journal article are generally large. Currently, clear incentives, including time for preparing journal articles, are missing.

The Committee recommends that the Chief Scientist and Department heads provide guidance on what type of peer reviewed publication might be appropriate for each project. Significant results and methodological advances can and should be disseminated in peer reviewed journals. Time and incentives should be offered for such work.

We recognize that as staff size shrinks the core tasks of publishing policy reports may take up a higher percentage of time. Nonetheless we believe that encouraging peer reviewed publication for many, if not all, projects has considerable advantages for PBL.

Publishing peer-reviewed journal articles serves several goals:

a. Increasing the scientific legitimacy of both the project and PBL's work as a whole;
b. Helping increase the scientific quality of each project. If people are going to publish they will try to be more rigorous in their research.
c. Educating researchers through peer-review feedback, thus improving future projects, formulation of research questions and identification of knowledge gaps at PBL;
d. Bringing the innovative work of PBL to the wider academic community, which enables methodological advances to be followed up in academic research and fed back to PBL, which may inspire cooperation with relevant scientists or university research groups;
e. Helping to attract and retain talented researchers, especially younger ones who might not otherwise want to spend part of their career at PBL, for example, as it would foreclose a transfer to a university institute or faculty.

- **Many PBL researchers do not have a clear view of the role of the Chief Scientist.**

From the interviews we learned that while no researchers expressed a negative opinion about the Chief Scientist, and some were positive about this new position, several people indicated that

they did not have a clear view of the role and purpose of the Chief Scientist. This requires attention. The cause may be that the Chief Scientist is a relatively recent function which still has to have an institute-wide impact. It is also possible that the visibility of the Chief Scientist needs improvement.

The Committee recommends that PBL management explain better to researchers the role of the Chief Scientist and how to interact with him/her.

This concerns in particular his/her role to facilitate internal and external discussions on contentious scientific issues and on different scientific views and methodologies.

- **The allocation of responsibilities for scientific quality control may not be optimally effective.**

In the self-evaluation report it is stated that: "Scientific quality control is not optimal. Various suggestions have been done to improve internal quality control; for example, by specific allocation of responsibilities. Others suggest that appointing a Scientific Director would be more appropriate than having a Chief Scientist, as a Director would have more power to intervene and enforce internal procedures for quality control." It was initially planned to have a Scientific Director, but since no candidates for this function could be found filling this position has been frozen for a while.

When looking at the formal task description of the Chief Scientist the Committee noted that most of his/her tasks are being described as coordinating, advising, evaluating and monitoring/control. It is also said that "Responsibility for all parts [of scientific quality control] remains where it has been before. Only now there is a supervisor/booster [the Chief Scientist] directly linked with the management to also take actual care of realization." It is further stated that the quality of the process in which products come about is the responsibility of the Deputy Director. The Committee thinks this is not logical if it concerns research processes, because the deputy director is more focused on operational management tasks. It would instead be more logical to appoint a Scientific Director or making the Chief Scientist responsible for this task. Furthermore, the Committee feels it is now not clear who has the responsibility for the total set of conditions that guarantee good quality research, except that the final responsibility lies, like with anything, with the general director. But he already has many other tasks.

The Committee recommends reconsidering the responsibilities and tasks of the Chief Scientist as well as the possible need for a Scientific Director.

The Committee does not feel itself in a position to give advice in this matter but recommends PBL to at least reconsider the responsibilities of the Chief Scientist and the advantages of a Scientific Director. A Scientific Director would perhaps make more sense as s/he can work fulltime and devote systematic and consistent time to all the factors of research quality. The Chief Scientist may lack the time as well as status as s/he is also subsumed under a Department Head. Alternatively, PBL could consider enlarging the responsibilities of the Chief Scientist and turning it into a fulltime position.

- **In times of shrinking budget and changing strategic priorities there is a risk that long term strategic research will be given lower priority.**

In times of budget cuts priority might be given to advisory work that responds to immediate policy needs, reducing strategic research. That would be undesirable. Strategic research is an important instrument for responding to emerging issues in society. The importance of such research can be well illustrated by PBL's internationally renowned work on integrative modelling (e.g. the IMAGE model). Integrative modelling is now highly appreciated and relevant for policy advice, but could not have been developed without long-term strategic research.

The Committee recommends PBL maintain its investment in strategic research.

5. ORGANIZATION AND HUMAN RESOURCES

STRENGTHS

- **PBL has a motivated and skilled staff and a positive work culture.**

PBL staff considers PBL to be a stimulating place to work. Internal cooperation is good and the organization has the flexibility to respond quickly to the needs of the ministries. While there are still cultural differences between the two institutes that were merged into PBL, the merger seems to be progressing well. The Committee welcomes the fact that internal collaboration across departments is increasing. It is expected that the move to The Hague in 2015 will further advance the integration.

- **PBL has chosen to conduct a dynamic reorganisation.**

To cope with the shrinking budget PBL has chosen an active strategy. It will reduce the permanent staff in phases while trying to keep in mind the expertise needed in the future. A formal reorganization would take more time and energy and imply application of the last-in-first-out principle, which would be detrimental for an organization in which the older generations are already over represented. There is an agreement entitled 'Dynamic reorganisation 2011–2018', between the Works Council and PBL on the arrangements to respond to the budget cuts. According to the agreement there will be no compulsory redundancies during the reorganisation process nor will any staff member be earmarked as candidate for outplacement. The Committee welcomes the forward-looking approach which helps PBL to manage the challenges of an organization with a skewed age distribution facing budget cuts.

- **PBL's critical self-evaluation reflects its aim of being a learning organization.**

The Committee was pleased to see that PBL saw the self-evaluation as an opportunity to learn and to improve its performance. The Committee appreciates the openness of PBL and its willingness to share its problems and weak spots. We hope that PBL will integrate this learning throughout the organization to become a true learning organization.

- **PBL Academy and other internal education provide a useful means of refreshing staff capacity and extending expertise in needed directions.**

PBL has its own Academy, which is led by the Chief Scientist. The PBL Academy offers courses for PBL researchers and other employees on various subjects such as on governance. Internal seminars are also organised, such as on the role of PBL researchers in projects for ministries. Also external speakers offer lectures and PBL provides guidance documents about dealing with uncertainty and stakeholder involvement. The Committee considers these documents to be state-of-the-art.

WEAKNESSES AND RECOMMENDATIONS

- **The Committee is concerned about the mix of expertise and skills within PBL. It does not seem to be adequate for achieving the strategic choices of the Charcoal Sketch.**

An internal analysis revealed that PBL is lacking some expertise and skills that are required to achieve the strategic choices. The audit Committee shares this observation. Especially in the field of social sciences, governance and behavioural economics PBL seems to lack adequate expertise.

- **Because of budget cuts there will be little opportunity to hire new people. Training and education will not be enough to solve this problem.**

Budget cuts will force PBL to reduce its staff to 165 FTE in 2015. Because it has decided that there will be no compulsory redundancies, reductions need to be realized by stimulating external mobility. Part of the reduction can be realized through retirements (2012-2015 16,3 FTE) and by not extending temporary contracts (2012 3,8 FTE), but an additional reduction of 30 FTE in permanent staff will be needed in this period. In this situation the opportunities to recruit new expertise are evidently limited. Although training and education of the present staff can solve part of the problem and though PBL has allocated € 750,- per person for education beyond the Academy, a few courses will not turn a climate scientist into an expert on governance. Moreover, to address new challenges also recruitment of some staff recently graduated with new skills is needed. We did not find any overall plan to address this problem.

The Committee recommends preparing a human resources strategy to support the implementation of the strategic choices. The strategy should be accompanied by a concrete plan to realize the actions needed, along with a monitoring plan.

The Committee was informed that plans for implementing the strategic choices and for realizing staff reduction have been developed for all departments as well as for the supporting staff departments. The Committee does not feel it is in the position to give extensive feedback and recommendations regarding these implementation plans. However, the Committee does want to emphasize the importance of realizing these plans. An even stronger central human resource policy might be needed if the yearly reduction of staff that is aimed for is not achieved. It might also require more stringent choices to be made in PBL's work programme.

PBL should consider the following options as ways to extend its capabilities in the coming years:

- increase collaboration with universities and other agencies;
- increase the use of graduate students and postdocs on projects of joint interest;
- take prompt action to help PBL staff in career development planning in relation to future PBL directions;
- as soon as is possible, recruit new staff with a background in behavioural economics , public policy and governance;
- strengthen the capacity to innovate in terms of methods and theory by as soon as possible offering young talents career opportunities at PBL.

Furthermore, the Committee recommends that PBL consider seeking more external funding.

There is little question that stable core funding from central government is ideal if PBL is to serve its purposes of providing unbiased research for policy making. However in the current conditions of government austerity, adequate funding may not be available for all the important priorities, strategic choices and research, much less for bringing in key new skills and knowledge to the organization. We believe that to fill this gap PBL should begin to seek appropriate external funds from EU and other sources. The percentage of external funding at PBL is low compared to many similar organizations. The government regulation for policy-analysis agencies allows for 20% of external funding. However, over the last four years only about 5% of PBL's total budget was externally funded.

We note that Ministerial rules form a disincentive for obtaining external funding: When PBL has a positive balance at the end of the year, this money flows back into the Treasury. Externally funded projects are often multi-annual projects, and money from these projects that is not spent in one year thus gets lost. Other governmental organizations like KNMI and RIVM have an exception to this rule. It is thus advisable that PBL seek a similar exception.

We see internal obstacles as well for increasing external funding like limited experience in proposal preparation and a lack of expertise and human resources for project administration, especially for EU framework programs. There are also very few incentives for staff to obtain external funding.

The Committee sees ample opportunities for PBL to increase its external funding. PBL has world class expertise, especially in biophysical modelling, integrated assessment and scenario analysis, which makes it uniquely positioned to play a leading role in national and international initiatives in mainstreaming of ecosystems and biodiversity into development planning. Furthermore PBL has a competitive edge in ecosystem-based adaptation to climate change, and is well positioned to develop the content of the inclusive Green Economy policy concept. There is untapped potential for PBL to lead global and regional (European) initiatives with a huge impact on policies. The Committee recommends that PBL increase collaboration with EU programs, work for individual policy Directorates-General and strengthen collaboration with (European) universities in the Seventh Framework Program and Horizon 2020.

However, increasing external funding should not in any way weaken the basic function of PBL. Therefore, we believe PBL should have a strategic discussion within the Agency as well as with the Ministry on external funding policy. If the conclusion is to actively look for funds, a strategy needs to be developed for this activity. This strategy should identify the prioritized sources of funding as well as major actions to be taken to provide the organization with the necessary skills and expertise to be successful in obtaining external funding.

The Committee recommends that the Ministry abolish funding rules that form a disincentive for obtaining external funding.

- **Within PBL there is no explicit attention to facilitation skills.**

  PBL's research and advice need to be closely linked to policy and society and remain scientifically sound. That means that specialized researchers need to communicate with policy makers and other stakeholders. PBL's work also requires collaboration between

disciplines. Both the interactions with stakeholders as well as interdisciplinary collaboration can benefit from skilled facilitation.

The Committee recommends that PBL build staff capacity in skills needed to support interdisciplinary collaboration and stakeholder participation.

- **There is room for further improvement of internal PBL education. Both in terms of the use of guidelines and in terms of the broadness of the courses that are offered.**

The Committee heard repeatedly that on a working level the guidelines on dealing with uncertainty and stakeholder participation are not known, recognized or used by staff. Also the Committee felt that the Master Class on governance could be broadened beyond the current focus on policy science to include for example behavioural economics.

The Committee encourages PBL to do more to promote training in and use of the guidelines and to continue to improve the courses that are offered.

6. ASSESSMENT OF PROJECTS

INTRODUCTION

In order to assess the quality of PBL's work the Committee made an in-depth study of eight projects. These projects were selected out of a longer list of 15 projects that was provided by PBL as a representative sample of PBL's work. All seven departments within PBL are represented in the list of eight projects. In addition the report *The Energetic Society* was studied. This essay reflects PBL's thinking on changing governance strategies and is an example of a so-called trend report, a new type of PBL product. Detailed summary reports were made available for each project.

The assessment is thus based on the review of these 8 projects. In addition the Committee made use of the data that were provided in the self-evaluation report (e.g. published articles, number of scholarly citations, reference to PBL's work in parliamentary debate and at internet websites). The self-evaluation report gives a more comprehensive but less detailed impression of the quality and relevance of PBL's work than the project assessments. Overall, the data presented in the self-evaluation report support the overall findings from the project assessments.

All projects, except *The Energetic Society* report, have been assessed on four aspects[5]:

1. Scientific quality: This aspect concerns among others the appropriateness of the chosen approach, the proper use of pre-existing scientific literature and the quality of the argumentation. In addition, it was examined if conclusions follow logically from the study and if uncertainties are addressed in a proper way.

2. Relevance: Relevance concerns the question of whether the findings of the study are actually useful for policy makers and other societal stakeholders. Do findings help policy makers make better policy and do findings help other stakeholders improve their actions in a way that is beneficial for society at large?

3. Research process quality. Apart from assessing scientific quality per se, the Committee also assessed how the research process contributed to achieving scientific quality. This aspect relates for example to the use of internal and external peer-review and collaboration with appropriate external experts.

4. Quality of science-policy-society interactions. This aspect relates to achieving relevance. It assesses how interactions with policy makers and other stakeholders contributed to 1) framing the project in a way that made it useful for them; and 2) transfer and uptake of the project's findings.

[5] A wide range of different projects was assessed. In order to do justice to the differences between projects, these four aspects get varying attention in the individual assessment reports.

The *Energetic Society* report is not a project in a traditional sense, but more like an essay. Therefore it cannot be evaluated using the same criteria as for the other projects. However, the report was taken into account in the Committee's assessment of the strategic choices, in the assessment of the horizontal themes, as well as in the overall assessment of PBL quality and relevance. It represents cutting edge thinking about governance and participation of various players and citizens in decision making and public action. It is a call for rethinking traditional practices of PBL and the government in ways that a number of leading Dutch and other scholars in Western societies have identified in their research.

The next section discusses the overall conclusion and some general lessons that can be derived from the project assessments. Subsequently, detailed assessment reports on each of the separate projects are presented.

Overall Conclusions and Broader lessons

Scientific Quality

While the Committee observed some variation in scientific quality and some recommendations for further improvement could be made, our overall impression of the scientific quality of PBL's work is very positive.

The Committee has two suggestions for improvements regarding PBL's work in general. The first concerns expertise on governance within PBL. While the Committee has been informed that some well-respected governance experts were involved in the project 'Roads from Rio+20', their involvement did not prevent the study's treatment of governance issues from showing some weaknesses. On the other hand the project 'Ex-durante evaluation of the Dutch spatial planning act' was very positively evaluated and seen as a good example of research on governance from which others in PBL might learn. It offers insights into interjurisdictional relationships and the relation between formal rules and informal practices. The Committee concludes that at least some good examples of governance expertise are available within PBL but that this expertise is not yet broadly used throughout all of PBL's work.

A second suggestion for improvement relates to characterizing and communicating uncertainties. For three of the assessed projects the Committee concluded that uncertainty could have been addressed better or in a more refined way ('Assessing an IPCC assessment', 'Demographic decline and its spatial consequences' and 'Climate adaptation in the Dutch Delta'). At the same time the Committee noted that PBL provides state-of-the-art guidelines for uncertainty characterization and communication. Apparently, the awareness and implementation of these guidelines need improvement. The Committee recommends that PBL draw more on its tradition of excellence in uncertainty characterization – most organizations stand to learn from PBL's approach. In addition, raising awareness and understanding among PBL's audiences on the relevance of uncertainty is recommendable.

Relevance

Overall the Committee considers the projects that have been assessed to be highly relevant, both for policy and for society at large. With regard to one project ('Roads to Rio +20') the Committee

noted that the timing of the research and publication was unfortunate as the results came too late to play a significant role at the Rio+20 conference.

Research Process Quality

Due to the variety of projects assessed the discussion of this aspect resulted in a range of different observations and recommendations.

For a number of projects the Committee would have liked to have seen the publication of peer-reviewed articles both as a means to share findings with the broader scientific community and as a way to demonstrate scientific quality. For one small project no external review had been organized because of time constraints. The Committee felt that in view of the brevity of the report and the complexity of the subject a quick external review would have been a good idea and might have been possible without a serious delay of the publication.

For two projects ('Nature Outlook of the Netherlands 2010-2040' and 'Ex-Durante evaluation of the Spatial Planning Act') the Committee considered the way stakeholder consultation was used during the research design and production of the report to be exemplary. The 'Climate adaptation in the Dutch Delta' on the other hand could have benefitted from broader stakeholder involvement.

The decision to use an open website to provide input from the public in the project "Assessing the IPCC Assessment' was good, but it proved not very effective. The Committee recommends PBL to give more thought to the implementation when similar initiatives are taken in the future.

Another lesson from the IPCC-project concerns the appearance of conflict of interest. In controversial studies any appearance of conflict of interest should be avoided by engaging researchers not closely associated with the subject of the study.

Finally in the Rio+20 project a problem was observed in obtaining timely input of data from an external organization.

Science-policy-society Interactions

Overall the quality of science-policy-society interactions is very good. The Committee felt that the impact of the 'Roads from Rio +20' project could have been enhanced through better definition of the report's most likely audiences from the outset.

ASSESSING AN IPCC ASSESSMENT: AN ANALYSIS OF STATEMENTS ON PROJECTED REGIONAL IMPACTS IN THE 2007 REPORT

Introduction

This report was prepared for the Minister for the Environment and responded to a Parliamentary debate raising questions whether mistakes in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) called into question the credibility of the IPCC. PBL developed a typology of errors and qualifications. These were used to review conclusions in the regional chapters by identifying and categorizing errors according to significance and origin. The final report identified a small number of errors and statements requiring qualification. None of these were deemed to invalidate the main conclusions of IPCC or challenge the basis of planning for sea level rise in the Netherlands. A number of recommendations to improve the IPCC process were given.

Scientific quality

A systematic methodology was adopted and the overall quality of the report is high. A good job was done at the outset in limiting the scope of the study – the concentration on the regional chapters provided an effective focus.

Because the methodology will be applied in the future, we offer a few observations to improve subsequent work. The typology of errors is inconsistently described in the summary and the body of the report, and the distinction between major "errors" and minor "statements requiring 'qualifications'" is not as "sharp" as claimed. It might also have been useful to have an error category of "inconclusive" for when information was inadequate to judge whether an error had occurred. There are possibly too many overlapping categories of "qualifications" related to inadequacy of information or referencing. Regarding the issue of reaching general conclusions from specific cases – a major challenge for the IPCC regional chapters – it was surprising that uncertainty characterization and communication, including assigning a confidence level for each conclusion, was not discussed and evaluated. The recommendation to have each IPCC chapter include two tables of "impacts" – one with positive and negative effects, and the other emphasizing "risks" – is offered without underlying documentation. For future studies the Committee recommends taking into account additional research, such as cognitive psychology on comprehension and usability by users.

Relevance

The Committee did not have the opportunity to discuss the broader societal and policy significance of the report.

Research process quality

The project was carried out under severe time constraints and without a ready-to-use methodology. While the credibility of the report was not questioned by the users, we question the wisdom of having the project led by individuals who could be perceived to have a large personal stake in the IPCC process. Independent oversight was provided by a Committee of the Royal Netherlands Academy of Arts and Sciences (KNAW). More information in the report about this oversight process would have reinforced the credibility of the findings and counteracted some of the concern about connections of the investigators to the IPCC. The use of an open

website to provide input from the public was good, but the implementation requires more thought if it is to be effective. Only a limited number of comments were received, of which only two were reported by PBL to be relevant to the task at hand. Peer review and more generally quality control seem to have been handled effectively.

Science-policy-society interaction
Interaction between PBL staff and users (the Ministry, Parliamentarians) effectively defined the scope of the report and the uses to which the conclusions would be put. Materials provided by PBL at the time of the audit indicate that communication of findings was effective. The Audit Committee, however, did not have the opportunity to verify this independently with the users.

Broader conclusions and lessons for PBL
The overall process used for this study provides a good model for similar analyses in the future, and we hope the suggestions offered above will be useful to improve the general methodology. Appearance of conflict of interest should be avoided by engaging researchers not as closely associated with the subject of the study. PBL should draw more on its tradition of excellence in uncertainty characterization in evaluating how others address this challenge – most organizations stand to learn from PBL's approach.

EX-DURANTE EVALUATION OF THE DUTCH SPATIAL PLANNING ACT

Introduction
In 2008 a new Spatial Planning Act (Wro) came into force and the Dutch Senate passed a motion calling on the government to carry out `monitoring and evaluation of 'the progress, problems and successes of the Wro in practice right from the start'. The minister asked PBL to carry out this evaluation. This Act was a fundamental revision of Dutch planning in that it abandoned the system of provincial approval of local land-use plans, for one with a stricter division of responsibilities and less interference with local plans by higher tiers of government. Researchers identified six goals for the legislation, operationalizing each on several indicators. Goals included restoring the primacy of the land use plan to guide development; shortening legal procedures; recovering the public costs of planning; implementing the adage of the National Spatial Strategy "decentralized where possible, centralized where necessary;" shifting from reactive to proactive policies; and distinguishing between non-binding spatial development visions and legally binding plans.

Scientific Quality
Although the full report was not available in English, based on the project summary and two journal articles, we obtained a fairly good understanding of the methodology researchers used. This was a challenging study because the first three goals were difficult to measure and the last three could not be quantified. In some cases there was no baseline information. However the researchers measured what they could with a sensible selection of indicators and combined this with appropriate qualitative methods including case studies and interviews with planners and authorities at various levels of government. We judge this to have been a thorough and balanced approach.

Relevance

The project was particularly challenging as during the time period several pieces of related legislation were passed and researchers kept having to adapt their research to remain relevant to changing legal contexts. The researchers managed to do that. This research has a high relevance to policy. It found, for example, that the fundamental goal of assuring the primacy of the land use plan to guide development will be difficult to achieve because of informal practices and ad hoc procedures which mean that, de facto, project development still dominates decisions.

Overall the project produced valuable findings for the future as national government continues to develop new spatial and environmental planning legislation. The findings reported in the peer reviewed articles are sophisticated and nuanced and they are relevant to planning law and practice in other nations as well. While recommendations have not been highly specific because of the shifting nature of legislation, researchers do suggest that greater attention needs to be paid to informal practices which may not change with new legislation unless incentive systems are changed as well.

Research process quality

The process of assuring scientific quality of the research was very good. The extensive consultation during the research design (see below) was particularly important to assuring the study would reflect the realities of planning processes and the issues of concern to those involved. The project resulted in three reports, two peer reviewed articles in English and one still under review, along with several other articles and conference papers in Dutch. The reports were externally reviewed by policy makers as well as by three university experts in Administrative Law.

Quality of science-policy-society interactions

The overall quality of these interactions seems exemplary. First, while researchers were preparing the evaluation design they conducted four sessions to discuss the most important changes to the practice of spatial planning that could be expected as a result of the new Act (Wro) and to focus on consequences for planning practice. These sessions included lawyers affiliated to universities, civil servants from all levels of government, consultants, and representatives from interest groups. The output of the sessions was an input to the evaluation design and sessions built a network of experts, whom researchers consulted later in the project to answer more detailed questions and/or to review draft texts. Moreover they kept the Ministry of Infrastructure and the Environment informed of progress and invited representatives to comment on the design of the evaluation and of the research to be conducted for the first and second reports. Representatives from the Association of Netherlands Municipalities (VNG) and the Association of Provincial Authorities (IPO) were also involved during the research design and were briefed on the findings.

Communication of results, uptake and impact seem very good. The lead researcher gave a presentation to policy makers from the ministry for each report and he and co-authors gave at least a dozen presentations and interviews in various venues, including at the level of local government. Senator Smaling who had requested the work, called it a “thorough and professional piece of work” and the findings were used in various legislative discussions. Findings were noted in a variety of other reports and websites, and provincial and local authorities along with interest groups have made use of the reports in their arguments and discussions.

Broader conclusions and lessons for PBL

This project is a good example of a kind of work that is both useful and actually used and that PBL can do well as a neutral research organization: ex-durante assessment of the implementation of new legislation on topics that are central to the Dutch environment and contested among levels of government and interests. The detailed description of how the reports were used in policy debates provides considerable insight into how findings can make a difference, and this level of detail could be helpful in reporting on the value of other projects. It is a good example of research on governance and others in PBL might learn from its insights into interjurisdictional relationships and the relation between formal rules and informal practices.

DEMOGRAPHIC DECLINE AND ITS SPATIAL CONSEQUENCES

Introduction

This project consists of a set of activities that range from detailed population and household projections at the level of 450 municipalities, to extensive interactions with stakeholders about the results and several studies of spatial policy challenges arising from the fact that in many parts of the country population sizes are projected to decline and even the number of households may shrink. The projections heavily rely on regional population projections by PBL, in collaboration with CBS, using the PEARL model, but also on PBL runs with the PEARL model as result of explicit project-driven demands. The studies of spatial policy challenges led to and were related to the doctoral dissertation "Demographic Decline and Local Government Strategies" by Femke Verwest. In the hearing with the responsible scientists it was said that due to the budget cuts, since 2010, PBL has not initiated new research on this theme.

Scientific quality

The projection model PEARL used for this project is clearly of the highest scientific quality. Dutch demographers are international leaders in the field of regional projections and household projection models, and this is reflected in the study. The PEARL model is indeed advancing the international state of the art in regional household modelling. Unlike most static headship-rate based models this micro-simulation based model also allows for fertility and mortality differentials according to life style (form of household) and has a strong regional differentiation. The detailed regional breakdown to the level of 450 municipalities is impressive. One major critical comment has to do with lack of reference to uncertainty. As far as can be seen from the available materials the project only presented one rather detailed scenario for the future with high spatial resolution. But at the level of small areas demographic projections tend to be very unstable. There is huge uncertainty in particular due to minor changes in internal migration patterns over time. Since such uncertainties in the projections are very relevant for any kind of planning and political decision making at the municipal level (Do we need to build a new school?) it seems that some crude assessment of uncertainties would have been absolutely essential. In the interview the project team indicated that they had used alternative scenarios but that the intended users found it difficult dealing with those and preferred using only one scenario. Hence, there may be a need to educate intended users in the relevance of uncertainty.

The Committee was pleased to hear that uncertainty about future regional population trends has been dealt with in subsequent PBL publications, like the Spatial Outlook.

Relevance

PBL itself took the initiative to study demographic decline and its spatial consequences. The motivation was agenda setting. At the time this study was started, little attention was paid to planning for demographic decline in actual practice. There is no doubt that this study addressed a highly relevant question which matters greatly at regional as well as national level. It has far reaching long term social, economic and environmental implications that need to be addressed. The great public interest in this topic is also reflective of this relevance. For purposes of urban and spatial planning, demographic data will be needed in more detailed breakdowns and projections than appear to be currently available, including household formation, age and income mix and internal and external migration patterns.

Research process quality

The study is based on a very sophisticated household model produced by PBL and CBS which is well documented but (not yet) published in the peer reviewed literature. Except for the PhD thesis of Verwest the findings of this study do not seem to have entered the international peer reviewed literature. While it is acknowledged that the main focus of this project was on agenda setting and translating research findings into policy advice, not on contributing to the international scientific debate, it still would be advisable to try to produce papers for submission to journals to communicate the findings to a broader national and international audience. PBL seems to have appropriately partnered with two very competent agencies, the Demographic Institute NIDI and the national statistics office CBS.

Science-policy-society interactions

The whole study managed to receive great public attention and has been mentioned in a large number of media reports. Relevant statistical information was disseminated via internet through several websites. The number of hits was reported to be large, especially for the figures on future demographic developments. Findings were discussed with local authorities and at a national conference with ministries. Indications were clear that this was seen to be a very important and timely topic and that the project managed to greatly raise the awareness about the issues involved and the policy challenges arising from demographic change.

Broader conclusions and lessons for PBL

Given the far reaching importance of regional level demographic change for many of the issues that PBL is concerned with (not least in the context of "energetic society") a continuation of work in this field should be considered. Whether or not this is done as an integral part of other thematic projects or as separate projects, it is important that explicit numerical information is provided about likely (alternative) scenarios on demographic trends. This should possibly be done in collaboration with competent institutes in the field such as NIDI and CBS.

ENVIRONMENTALLY HARMFUL SUBSIDIES

Introduction

The project was initiated as a result of a request from the Ministry of General Affairs. It aimed to identify the main subsidies which could be removed so as to considerably benefit the treasury, and thus contribute to financial budget cuts of the national government, as well as reduce negative impacts on the environment. The study had two components: a review of the literature, and a further analysis of possible indirect effects of removing subsidies. This work fits under the strategic choice "Calculating and describing the effects of policies", which is "the core business of PBL" according to the self-evaluation report of PBL. The project report was written in Dutch but later translated in English (not a one-to-one translation though). According to the authors, because of time pressure and size of the report (15 pages) it was published only online.

Scientific quality

The report is partly a review and partly an educated judgement of which environmentally harmful subsidies in the Netherlands can be removed with which environmental and (socio-) economic impacts. All relevant studies are taken into account (except one mentioned below). Some judgements are disputable (e.g., that indirect or general equilibrium effects could be as considerable as to change the sign of direct effects of removal of subsidies), but generally the quality of the arguments is good. The project is based on two main studies for the Netherlands and tried to add some arguments to these to arrive at a selection of subsidies that are significant in financial and environmental terms. The authors mention that in addition to existing analyses, attention needs to be given to a substitution effect which may translate the sign of the direct environmental impact into an opposite sign of the net effect (i.e. a direct plus indirect or substitution effect). They mention as examples removal of subsidies on public transport that may lead to shifts to the private car, and removal of regulations to reserve land for agriculture that may lead to construction of other activities. Both could then increase the environmental impact. This argument is, however, conditional upon the assumption that no strict environmental regulation is implemented. Of course, removal of environmentally harmful subsidies is generally discussed as part of a policy package that also includes the implementation of environmental regulation. Under these conditions the removal of the subsidies will generally reduce environmental impacts. This might have been noted to avoid that policy-makers misunderstand the ideal conditions for, and underestimate the potential benefits of, removing subsidies.

Relevance

The research is very policy relevant as the ideal of a green economy is widely seen to not only require the implementation of serious environmental regulation but also the elimination of incorrect existing policies like environmentally harmful subsidies. The estimated gains for the treasury are considerable, namely € 5 to 10 billion, which is considerably higher than what was ex ante felt to be the magnitude of these gains by some public officers. Of course, any removal of a subsidy has to be judged also in terms of its wider social impacts as well as the original motivations for introducing it. The report notes the first element and might in this context have referred to a study undertaken several years ago upon the request of the Ministery of VROM. This study was aimed at assessing these complementary impacts, for which seven social

indicators were considered (see J.A. van Ast, K.E.H. Maas and J.J. Bouma, 2005, Duurzaamheidseffecten Aanpak Milieuschadelijke Subsidies, Erasmus University Rotterdam).

Research process quality
This was a small project (50 k€) which was executed under some time pressure. This meant, among others, that only internal reviewers were used. Given the quite complex issue of hypothetical impacts of removal of an existing instrument, advice from external experts might have been useful. As the report is very short (15 pages) reviewers would most likely have been able to come up with a quick judgement in a relatively short time.

Science-policy-society interaction
This can be assessed as very good. The project arose from interactions between PBL researchers working on the project "Greening the Economy" and public officers at the Ministry of General Affairs. We understand the formulation of the policy question was instigated by the researchers. They might have broadened this to include the mentioned social effects and original reasons for the subsidy, as then the resulting broader report would have allowed for a more complete discussion about subsidy removal. But we also understand that such a broader approach might have conflicted with the limited time that was available for carrying out the project. Although there was no immediate reaction on the project from the policy-makers, over time the publication has had several political responses and consequences (e.g., the parlementary motion Thieme/Sap in September 2011, Coalition agreement November 2012).

Broader conclusions and lessons for PBL
This case shows that a small project can have much policy impact. Perhaps it can serve as an example of how time pressure can affect the review procedure. Our suggestion is that in view of the brevity of the report (15 pages) a quick external review might have been possible without a serious sacrifice in terms of the speed with which the project was undertaken.

ROADS FROM RIO+20: PATHWAYS TO ACHIEVE GLOBAL SUSTAINABILITY GOALS BY 2050

Introduction
Driven by concerns about the feasibility of sustainable development goals agreed by global leaders in 1992, *Roads from Rio+20* analyses the range of scenarios, combining technological measures and consumption changes, through which these goals might be reached. The project started in September 2011 and ended in June 2012, with a budget of 400,000 Euros. It built on integrated assessment modelling work at PBL (IMAGE framework). The project addressed what would be needed to achieve sustainable development targets by 2050 – as well as short-term targets for reaching these goals.

Scientific Quality
The work was primarily based on existing models at PBL. Most of these models are robust but centred on biophysical sciences. The research team possessed adequate expertise to carry out this kind of model-based analysis. While the report aimed to provide information on governance measures, the conclusions are quite abstract and general, and reflect more a European orientation than a perspective that is fully global. The Committee concluded that the methods used were insufficient to achieve full integration of societal parameters including governance

and institutions. While the Committee has been informed that some well-respected governance experts were involved in this project their contribution was not strong enough to make this study's conclusions about governance truly relevant to international decision makers coming from varied political systems.

Relevance

This was a flagship project of the PBL designed to influence the global agenda of sustainable development, one of the major themes of Rio+20 events in Rio de Janeiro in June 2012, where more than 400 ministers and more than 50 heads of state met to deliberate on this issue. This was a strategic project for PBL to reach out to the global community with credible modelling and analysis of response pathways. The project was demand driven and arose out of a perceived need for a global policy agenda. The report seems to have had more impact nationally than internationally in its aim to influence policy thinking. Internationally timing was an issue. The report arguably was completed 9-12 months too late to have immediate impact on the pre-conference meetings in New York where the bulk of the preparatory work for Rio +20 was done. However, given its attention to sustainable development goals, its impact may continue beyond Rio+20. The Committee was told that for instance, conceptually UNEP-GEO5 is largely based on Roads from Rio+20. Also a session was organised at the Planet under Pressure conference and the PuP Policy Brief on energy was based on Roads from Rio+20, which was forwarded by IGBP as input to the summit.

Research process quality

The report was reviewed both internally and externally and one peer reviewed publication has resulted from it. This relatively modest output may reflect an absence of scientifically unexpected conclusions and the acknowledged difficulties in relating governance science to integrated assessment model outcomes. Internal communication within PBL was smooth. There was a problem obtaining timely economic baseline data from OECD.

Quality of Science-Policy-Society Interaction

The report has reached Dutch audiences, and further communication is contemplated through a website and app. In retrospect, the report seems to have suffered from the absence of a clearly defined client group which it was seeking to address. The recommendations on governance in particular are too general to provide guidance in widely divergent policy cultures.

Broader Conclusions and Lessons for PBL

Roads from Rio+20 makes a valiant effort to tie integrated assessment modelling to governance approaches in addressing an international policy concern of utmost seriousness. The project underlines the importance of identifying client groups in advance and communicating with them so as to ensure effective uptake. It also illustrates the need for a more intensive research effort to meet the challenges of linking assessment outcomes to effective governance strategies.

NATURE OUTLOOK FOR THE NETHERLANDS 2010-2040

Introduction

This report was produced in response to a statutory obligation to deliver a Nature Outlook every four years and in recognition of several sources of strain: reduced budgets, policy decentralization, low public understanding and involvement, and pressure to meet targets toward realizing a National Ecological Network, consisting of both newly created habitats and existing natural areas. In addition, the Dutch implementation of the EU Natura 2000 policy was also perceived as having become too procedural and detached from the actual use and experience of nature. The report's aim is to provide a framework in which nature and landscape policy could be developed with more transparency and stronger grounding in societal values. An 8-member project team drew from PBL and Wageningen University and Research Centre; the project time frame was January 2009 to Spring 2012 and it was completed at a cost of 5.2 m€, 90 percent for personnel at the two participating institutions.

Scientific Quality

The report's primary contribution is a radical reframing of the terms in which nature and landscape policy should be discussed in the Netherlands in the longer term. Specifically, it proposes a four-fold classification of nature: vital, experiential, functional and tailored. These correspond to four different ways in which people value nature, namely, for itself, for recreation, for ecosystem services, and for beneficial use. Building on existing approaches to scenarios and models, but seeking to make them more transparent and policy-relevant, the project moved from descriptive to normative, that is, with a view to elucidating how people might want Dutch nature and landscape to develop over the coming thirty years. Important innovations in the project include integration of stakeholder viewpoints in scenarios, simplification of models, and combining concerns for legitimacy and salience with relevance and scientific quality.

This is an excellent example of PBL creating a novel, policy-relevant discourse that is neither "scientific" nor "political" in a conventional sense. The proposed conceptual scheme therefore cannot be evaluated by normal standards of scientific merit: its results derive from a set of participatory exercises rather than from academic research pure and simple. The approach is broadly in keeping with analyses of nature in environmental social sciences, but there is nothing quite like it in those literatures. It is, however, consistent with PBL's mission to create relevant and legitimate frameworks for enabling policy. The success of the exercise will have to be judged partly by whether it allows policy makers and citizens to overcome the above-described difficulties and blockages that preceded the report, and perhaps also by the uptake of this schema in other policy cultures (e.g., the Chinese government has apparently shown an interest in adopting this approach). As a report that aims to guide thinking for thirty years, it cannot be fairly judged until more time passes by. It does provide a balanced, well-considered analytic tool with which to evaluate environmental trade-offs, keeping in mind that nature protection always involves weighing competing values and uses.

Relevance

The report has high relevance for policy and planning. It is also timely. Not only is the report required by law but it comes at a moment when political pressures mandate a need for fundamental re-envisioning of goals and strategies. The report breaks new ground by taking a long-term view and laying out terms in which comparisons can be made and trade-offs

considered, since achieving some desirable outcomes will inevitably be at the expense of others. For example, the report offers a conceptual framework that includes ecosystem services as well as biodiversity as desirable endpoints, whereas only the latter figured in prior discussions. Though not explicitly stated (in the English summary), this report is also broadly consistent with the aims of the *Energetic Society* report and hence serves to build coherence in PBL's efforts to integrate social knowledge and social energy into its scientific functions.

Research process quality

The most notable process innovations relevant to scientific quality were made during production of the report. Stakeholder consultation was broadened to include often neglected viewpoints, such as migrants. Exceptional efforts were made to involve groups, such as the farm industry, who had not participated in the scenario workshops. The report underwent review by internal and external boards, the latter consisting of ministry and CPB representatives, and by the PBL Chief Scientist and head of communication. In short, it was an excellent and thoughtful process, though participants were chosen by PBL and the process was not oriented toward what some have called "uninvited publics." Relatively little was published in the peer-reviewed literature or in English.

Science-Policy-Society Interaction

As noted, this report benefited from an exceptionally interactive and iterative process. Both the process used for producing the report and the multiple layers of review ensured attention to communication between the PBL team and relevant external groups, including policymakers. Considerable effort has been made to publicize the results within the Netherlands and to keep the discussion on nature policy alive. Two areas in which policy relevance could have been improved are translation of the scenarios into clear policy messages and identification of indicators to facilitate comparison across scenarios. It is unclear how the report addresses the decentralization of nature and landscape policy.

Broader Conclusions and Lessons for PBL

This project provides potential benchmarks for how to conduct publicly relevant and inclusive scenario-building aimed at long-term development of nature and landscape in industrial democracies, where untouched nature is not in play and policy necessarily involves trade-offs among competing visions. It introduces new policy-relevant framings and language that might influence global discourse. However, more could be done to ensure wider dissemination of the report's highly original conceptual and procedural contributions to environmental governance by targeting publication toward a wider range of peer-reviewed international journals.

CLIMATE ADAPTATION IN THE DUTCH DELTA

Introduction

This report was commissioned in 2008 by the Dutch Ministry of Housing, Spatial Planning and Environment (VROM). PBL was asked to investigate options for climate-proofing spatial development in the Netherlands. The project was carried out in two phases between 2008 and2011 with a total project budget of 2.8m Euro. In the first phase the main challenges for adapting to climate change were identified, and the types of policies needed to tackle these

challenges were indicated. Based on the results of the first phase strategic options for climate-proofing the Netherlands were further elaborated in the second phase. After the elections and reshuffling of ministries the report was delivered to the Ministry of Infrastructure and Environment (I&M). The report presents five key messages:

- Unbreakable dykes and managing spatial development in the Rhine-Meuse floodplain will make the Netherlands safer and more climate resilient.
- Climate-proofing fresh water supplies will require a more flexible water system and better use of the water in the Rhine.
- Climate-proofing ecosystems and biodiversity will require revising the strategy behind the National Ecological Network.
- Implementation of climate-proofing measures in urban development today may considerably reduce costs for tomorrow.
- A clear division of responsibilities between central government and other parties is needed.

Scientific quality
The modelling portion of the report is based on sound analysis and the report had a strong impact.

The project has reached a limited level of integration between the adaptation strategies for flood risks, water supply, nature and urban areas. The integration is limited to the governance and legal aspect of the measures considered.

It is a pity that PBL did not push its collaborators to deliver the material that could have been used to perform an integrated cost-benefit analysis. It was also surprising that the report did not include analysis of the incremental costs of preparing for higher versus lower levels of sea level increase and storm surge.

Within the context of an adaptive strategy with respect to flood risks, water supplies, nature, and urban areas, dealing with uncertainty was the starting point of this projects analysis of adaptation options. The project did however not use any formal uncertainty analysis of the model results. The summary report contains an Appendix that discusses the uncertainty ranges in projections of climate change, sea level rise, and water discharge from rivers, but it does not appear that these results were used.

Relevance
This PBL study has been very relevant in various ways. First it presented a set of recommendations that add new insights to the Delta Committee's plans and recommendations. Especially PBL's alternative for the Delta Committee's advice to raise the IJsselmeer water level, viz. more efficient use of Rhine water, has shaken up the discussion and made it much broader. As a consequence of this study PBL has better collaboration with the Delta Programme and is involved in major discussions about the future of the Dutch Delta.

Research process quality
This study was carried out with six Dutch universities and institutes and has been co-funded by the two large Dutch national climate research programmes ('Climate Changes Spatial Planning' and 'Knowledge for Climate'). As such, the project involved many of the relevant research groups in the Netherlands that contributed complementary expertise. The project delivered three main

documents with English translations and six background reports from the collaborating partners. Five peer reviewed articles have been published.

Unfortunately, the involvement of stakeholders beyond ministries, provinces and water boards is missing. The Netherlands is very advanced in ways and methods to involve stakeholders and this project could certainly have benefitted from involvement beyond governments at various levels. It is understood that the political situation (ministerial change and the creation of the politically very visible Delta Committee) limited PBL's options to involve other stakeholders (see below on science-policy-society interface). Nevertheless, the Audit Committee considers this a missed opportunity to enhance a classical model based study using state-of-the-art techniques for adaptation planning.[6]

Science-policy-society interactions

In the course of the project the Dutch government installed the 2nd Delta Committee, a high level committee to advise the government on potential consequences of and adaptations to climate change in the Dutch Delta area. In combination with reshuffling of Ministries this caused some delay and confusion at the start of the project. The relation with the Delta Programme (which was launched at the advice of the Delta Committee for implementing a long term strategy on flood protection, water supplies and climate proofing (re)development of urban areas) was unclear in the beginning. The PBL study was seen as a competing research process rather than a potentially supportive one. This became better later on.

Besides the limited involvement of stakeholders (see above), the project had quite some impact on the thinking of the Delta Programme and the relevant ministry. As a consequence, PBL is now better linked to this Programme, in particular as partner of the "Delta Scenarios" project (with CPB, KNMI, Rijkswaterstaat and Deltares). The PBL director and the project leader presented the results in public and in the media (including in leading Dutch newspapers).

Broader conclusions and lessons for PBL

Given the importance of the Delta for Dutch society it is advised to involve a broader range of stakeholders in the follow-up of this project. In particular, the "Delta Scenarios" project could benefit from such approach (and the collaborators in this project could benefit from PBL's experience). This new project could also be the base for a solid risk assessment and integrated cost-benefit analysis which is lacking in the current PBL report.

[6] See for example: US National Academy of Sciences. America's Climate Choices: Panel on Adapting to the Impacts of Climate Change. Washington, DC: 2010. ISBN: 0-309-14592-9.

ANNEX A MEMBERS OF THE AUDIT COMMITTEE

Leen Hordijk, is Principal Adviser to the Director-General, Joint Research Centre of the European Commission (JRC). He started at the JRC as the Director of the Institute for Environment and Sustainability in Ispra (Italy) in May 2008 and was appointed Principal Adviser to the Director-General of the JRC and Head of the Task Force on Modelling in September 2011. Before joining the European Commission, Professor Hordijk was from 2002-2008 the Director of the International Institute for Applied Systems Analysis (IIASA), in Laxenburg, Austria. Prior to joining IIASA, he was Director of the Wageningen Institute for Environment and Climate Research in the Netherlands and from 1991 until September 2011 professor in Environmental Systems Analysis at Wageningen University. He was also Chairman of the Social Science Research Council of the Netherlands Organisation for Scientific Research (NWO). Leen Hordijk received his Ph.D. in economics from Vrije Universiteit, Amsterdam. Beginning in 1984, he pioneered the development of methods for linking environmental science and economics for integrated assessments of air pollution problems in Europe.

Judith Innes is Professor Emerita of City and Regional Planning at the University of California, Berkeley. She obtained her Ph.D. in Urban Studies and Planning from MIT in 1973 and her B.A. in English from Harvard University in 1959. She was on the faculty from 1974-2011 and director of UC Berkeley's Institute of Urban and Regional Development from 1994-2004. Her research has focused on information use in public policy and more recently on collaborative methods of decision making, particularly in water management and environmental policy. She is author of 80 articles, along with two major monographs, including one on metropolitan transportation planning. Her two most recent books are *Knowledge and Public Policy: The Search for Meaningful Indicators* (Transactions 1990) and *Planning with Complexity: Introduction to Collaborative Rationality for Public Policy* (Routledge 2010).

Sheila Jasanoff is Pforzheimer Professor of Science and Technology Studies at the Harvard Kennedy School. She is the author of more than 100 articles and chapters and author or editor of a dozen books, including *Controlling Chemicals*, *The Fifth Branch*, *Science at the Bar*, and *Designs on Nature*. Her work explores the role of science and technology in the law, politics, and policy of modern democracies, with particular attention to the nature of public reason. She was founding chair of the STS Department at Cornell University and has held distinguished visiting appointments in the US, Europe, and Japan. She has received a Guggenheim Fellowship, the Sarton Chair of the University of Ghent, and an *Ehrenkreuz* from the Government of Austria. She holds AB, JD, and PhD degrees from Harvard, and an honorary doctorate from the University of Twente.

Lea Kauppi is Director General of the Finnish Environment Institute (SYKE), a multidisciplinary environmental research institution, since 1995. Before that she was the Head of a research unit working on coastal and inland waters, biodiversity and environmental monitoring. She received her PhD from the University of Helsinki in 1984. Her research focus has been on agricultural pollution of rivers and lakes, modelling of impacts of acidification, impacts of climate change as well as management of trans-boundary waters. She has a long experience on working at the

science–policy interface related to various environmental issues. Professor Kauppi has been a member of Finnish environmental research councils for twelve years. As a member of the Science and Technology Policy Council she was actively involved in the development of the Finnish research and innovation policy. She has also served the EU Commission as a chair and vice-chair of several advisory groups for environmental research, participated in evaluations of EU RTD Framework programmes and was a member of evaluation panels of various research institutions and research programmes in Europe. She is a member of the International Resource Panel of UNEP since 2008.

Pushpam Kumar is Chief of the Ecosystem Services Economics Unit, Division of Environment Programme Implementation at UNEP (United Nations Environment Programme) where he works on mainstreaming of the ecosystem services into development policy. He is also on the faculty of Environmental Sciences, University of Liverpool, UK. He has been engaged in international scientific assessment efforts on biodiversity and ecosystems and climate change (e.g. Millennium Ecosystem Assessment and IPCC). He was the Scientific Co-coordinator of the Conceptual Framework for the TEEB. Dr Kumar has taught and conducted research in Ecological Economics at the Universities of Liverpool, Cambridge and Delhi for the last two decades. His research has been on designing market based response options for management of biodiversity, economics of ecosystem services, ecosystem accounting, and linkages of poverty and environment. Dr Kumar has numerous publications in peer reviewed journals of international repute. He has authored, co-authored, edited and co- edited more than fifteen books. Currently, he is also on the editorial board of the journals *Ecological Economics, Ecological Economy* and *Global Environmental Politics*.

Wolfgang Lutz is Founding Director of the Wittgenstein Centre for Demography and Global Human Capital (a collaboration between the International Institute for Applied Systems Analysis (IIASA), the Vienna Institute of Demography (Austrian Academy of Sciences) and the Vienna University of Economics and Business (WU)). He is also Professorial Research Fellow at the Oxford Martin School for 21st Century Studies. He holds a Ph.D. in Demography from the University of Pennsylvania (1983) and a second doctorate (Habilitation) in Statistics from the University of Vienna. He has worked on family demography, fertility analysis, population projection, and the interaction between population and environment. Lutz is author and editor of 28 books and more than 200 refereed articles, including seven in "Science" and "Nature". In 2008 he received an ERC Advanced Grant, in 2009 the Mattei Dogan Award of the IUSSP and in 2010 the Wittgenstein Prize, the highest Austrian science award.

Richard H. Moss is a senior scientist at Pacific Northwest National Laboratory's Joint Global Change Research Institute at the University of Maryland. Moss chairs the US National Academy of Science's Board on Environmental Change and Society. He has long experience at the science – policy – society interface and has played leading roles in the US National Climate Assessment and the Intergovernmental Panel on Climate Change (including as head of one of the Technical Support Units). Moss is a fellow of the American Association for the Advancement of Science (AAAS), received the US Department of Energy's "Distinguished Associate" award in 2003, and was named a fellow of the Aldo Leopold Leadership Program in 2001. His research interests include development and use of scenarios, characterization and communication of uncertainty, and vulnerability and adaptation to climate change.

Jeroen van den Bergh is ICREA Research Professor at, and deputy director Research of, the Institute of Environmental Science and Technology, Universitat Autònoma de Barcelona. He is also professor of Environmental and Resource Economics in the Faculty of Economics and Business Administration and the Institute for Environmental Studies, VU University Amsterdam. Previously, he occupied professorships in Environmental Economics (1997-2007) and ´Nature, Water and Space´ (2002-2007) at VU University, and was a member of the Energy Council of the Netherlands (2003-2007). He has a Master degree in Econometrics from Tilburg University (1988) and a PhD degree from VU University (1991). His research is on the intersection of economics, environmental science and innovation studies. He is editor-in-chief of the Elsevier journal *Environmental Innovation and Societal Transitions* and editor of the Edward Elgar book series *Advances in Ecological Economics*. He was awarded the 2002 Royal/Shell Prize and the 2011 IEC Environmental Prize ("Premi Sant Jordi de Medi Ambient").

ANNEX B PROGRAMME OF THE AUDIT COMMITTEE VISIT

Monday 12 November:

11:00–12:00	Meeting with representatives from the PBL Advisory Board
	Ms Annemarie van der Rest
	Mr Rudy Rabbinge
	Mr Hans van der Vlist
13:30–14:30	Meeting with PBL's General Management Team and its Chief Scientist
	Mr Maarten Hajer, Director
	Mr Reinier van den Berg, Deputy Director
	Ms Jacqueline Timmerhuis, Head of Communication and Management Support
	Mr Arthur Petersen, Chief Scientist
14:30–15:30	Meeting with Dutch Government officials:
	Mr Siebe Riedstra, Secretary General of the Ministry of Infrastructure and the Environment
	Mr Alexander Verbeek, Policy Coordinator Gulf Region at the Ministry of Foreign Affairs
	Ms Atty Bruins, Manager, Nature and Regional Policy, Ministry of Economic Affairs
	Mr Sebe Buitenkamp, Head of the Department of Coordinating Patronage and Strategy (DGMI) at the Ministry of Infrastructure and the Environment
	Mr Ferdi Licher, Director of the Dept. of Knowledge and Outlooks of the Ministry of the Interior and Kingdom Relations
15:30–16:15	Meeting with the directors of research institutes that work closely with PBL
	Ms Birgit Loos, National Institute for Public Health and the Environment (RIVM)
	Mr Remko Ybema, Energy research Centre of the Netherlands (ECN)
	Mr Cees Slingerland, Wageningen University and Research Centre
	Mr Wim Turkenburg, Copernicus Institute, Utrecht University
16:15–17:00	Mr Free Huizinga, Sector Head at CPB Netherlands Bureau for Economic Policy Analysis
	Mr Gosse van der Veen, Director of Statistics Netherlands (CBS)

10.30 – 11.00 Discussion with PBL researchers about *Roads from Rio +20, Pathways to achieve global sustainability goals by 2050*

Mr Detlef van Vuuren (KLE)
Mr Marcel Kok (NLG)
Mr Pieter Boot (Head of KLE)

11.00 – 11.30 Discussion with PBL researchers about *Climate Adaptation in the Dutch Delta*

Mr Willem Ligtvoet (WLV)
Ms Marijke Vonk (WLV)
Mr Joost Knoop (WLV)
Mr Guus de Hollander (Head of WLV)

14.00 – 14.30 Discussion with PBL researchers about *Assessing an IPCC Assessment*

Mr Leo Meyer (KLE)
Mr Arthur Petersen (Deputy Head of IDM and Chief Scientist)
Mr Anton van der Giessen (Head of IDM)

14.30 – 15.00 Discussion with PBL researchers about *Nature Outlook 2010–2040*

Ms Petra van Egmond (NLG)
Mr Rijk van Oostenbrugge (NLG)
Mr Arjen van Hinsberg (NLG)
Mr Ed Dammers (ROL)
Mr Keimpe Wieringa (Head of NLG)

16:00–17:00 Discussion with PBL researchers:

Mr Herman Vollebergh (DO)
Mr Gert Jan van den Born (WLV)
Ms Martha van Eerdt (WLV)
Ms Elke Stehfest (KLE)
Mr Michel den Elzen (KLE)
Mr Ben ten Brink (NLG)
Mr Kees Schotten (IDM)
Ms Jeannette Beck (Deputy Head of NLG)

Wednesday 14 November:

10.45 -11.15 Discussion with PBL researchers about *Environmentally harmful subsidies*

Mr Aldert Hanemaaijer (DO)
Mr Eric Drissen (DO)
Mr Frank Dietz (Head of DO)

11.15 – 11.45 Discussion with PBL researchers about *Trends Report: The energetic society*

Mr Maarten Hajer (Director)
Ms Sonja Kruitwagen (DO)
Ms Daniëlle Snellen (V&M)
Mr Albert Faber (formerly KLE, now external at WRR)

11:45–12:30 Discussion with PBL researchers

Ms Anet Weterings (V&M)
Mr Anco Hoen (V&M)
Mr David Hamers (ROL)
Mr Leendert van Bree (ROL)
Mr Melchert Reudink (DO)
Mr Peter Janssen (IDM)

14.00 – 14.30 Discussion with PBL researchers about *From combating to managing; Demographic Decline in the Netherlands*

Mr Frank van Dam (V&M)
Ms Femke Verwest (V&M)
Ms Dorien Manting (Head of V&M)

14.30 – 15.00 Discussion with PBL researchers about *Ex-durante evaluation of the Dutch spatial planning act*

Mr Edwin Buitelaar (ROL)
Mr Niels Sorel (ROL)
Mr Ries van der Wouden (Head of ROL)

15:00–15:30 Meeting with representatives from the PBL Works Council

Mr Martijn Eskinasi (V&M)
Mr Leo Pols (ROL)
Mr Peter van Puijenbroek (WLV)

15:30–16:00 Meeting with staff from PBL's Office of Communication and Management Support

Ms Jacqueline Timmerhuis (Head of CBO)

Ms. Marjolijn Mercx (Press Officer)

Ms. Nienke Noorman (Publishing department)

18:15–22:30 Dinner hosted by PBL with PBL General Management Team, the Chief Scientist and representatives from the Advisory Board (Ms Van der Rest and Mr Piet Rietveld)

Thursday 15 November:

09:00–10:00 Meeting with Department Heads:

Mr Ries van der Wouden (Head of ROL)

Ms Dorien Manting (Head of V&M)

Mr Frank Dietz (Head of DO)

Mr Anton van der Giessen (Head of IDM)

Mr Pieter Boot (Head of KLE)

Friday 16 November:

11:00–12:00 Presentation of the Audit Committee's preliminary findings to the Advisory Board

Ms Annemarie van der Rest

Mr Rudy Rabbinge

Mr Hans van der Vlist

13:30–15:30 Presentation of the Audit Committee's preliminary findings to PBL's Management Team and Chief Scientist, followed by discussion

Mr Maarten Hajer, Director

Mr Reinier van den Berg, Deputy Director

Ms Jacqueline Timmerhuis, Head of CBO

Mr Frank ter Veer, Head of BPO

Mr Arthur Petersen, Chief Scientist

Ms Dorien Manting, Head of V&M

Mr Ries van der Wouden, Head of ROL

Mr Anton van der Giessen, Head of IDM

Mr Frank Dietz, Head of DO

Mr Pieter Boot, Head of KLE

Mr Guus de Hollander, Head of WLV

Mr Keimpe Wieringa, Head of NLG

List of abbreviations:

KLE	Department of Climate, Air and Energy
DO	Department of Sustainable Development
ROL	Department of Spatial Planning and Quality of the Local Environment
V&M	Department of Urbanisation and Transport
NLG	Department of Nature and Rural Areas
WLV	Department of Water, Agriculture and Food
IDM	Department of Information, Data and Methodology