

Improving data and information exchange in the chain of climate research, impact research, to policy making

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Abstract— It is all too often difficult for a stakeholder to obtain an overview of available climate and impact data, judge their quality and the assumptions behind or how uncertainties are taken into account. This implies a serious limitation in the sense that stakeholders risk to miss crucial information, misinterpret what they obtain and base complex decisions on non-consistent data.

As part of the Knowledge for Climate programme a project was initiated in which we attempt to integrate information and data on climate change and its impacts in a similar way for a number of sectors (climate, hydrology, ecosystems, agriculture, land use) among others through a web portal and integrated data sets on climate change and its impacts for the Netherlands. An important research question is “How can this data and information be made consistent across location, disciplines and applications?”

The approach followed includes among others the following aspects: 1) stakeholder consultations, 2) generation of data on climate change and impacts for a predefined and limited number of combinations of climate scenarios and spatial scenarios and time horizons, 3) overview of interactions, exchange of data, inconsistencies, ways of handling uncertainties, etc. for the various disciplines.

Index Terms— integrate climate and impact information, stakeholder consultations, uncertainties

1 Problem definition and aim

Many long term decisions on infrastructure, spatial planning, economy etc. are based on information on the climate for the lifetime of the object in question. Governments, businesses and private companies, as well as organisations increasingly need data and tailored information on climate change and its impacts in order to allow them to make informed decisions on climate adaptation strategies. However, it is all too often difficult for a stakeholder to obtain an overview of available data, judge their quality and the assumptions behind or how uncertainties are taken into account. This implies a serious limitation in the sense that stakeholders risk to miss crucial information, misinterpret what they obtain and base complex decisions on non-consistent data. Getting an overview and integrated data sets is even more difficult when stakeholders are involved in border crossing projects.

Recent research on climate change, possible impacts and adaptation options in the Netherlands has been substantial in the Netherlands. There are, however, some shortcomings which hamper the dissemination, the proper use of data and information and the integration of information from the various sectors and which are related to the above mentioned aspects:

1. no cross sectoral overview on available information on climate change and its impacts;
2. results sometimes inconsistent between sectors;
3. results often not available in format that can be used directly.

As part of the research programme Knowledge for Climate (KfC) a project was started up with the aim to improve data and information exchange in the chain of climate research, to impact/adaptation research, to policy making. In the first phase a pilot web portal was developed with the goal to integrate information and data on climate change and its impacts in a similar way for a number of sectors (climate, hydrology, ecosystems, agriculture, and land use) (Bessembinder et al., 2012). The second phase of the project builds on by creating integrated data sets and an overview of the available data and information from various disciplines.

2 Approach followed and some results

2.1 Web portal

In this project a web portal was developed to overcome the above mentioned problems partly. It attempts to:

1. provide overview of available data and information, but also of interactions and exchange of data between disciplines, inconsistencies, ways of handling uncertainties, etc.;
2. synchronize the presentation of the available data and information from the various sectors;
3. tailor data and information.

The web portal focuses on data and information for the physical climate system, water, nature, agriculture and changes in land use due to socio-economic developments¹. These subjects comprise the most important factors in land use in the Netherlands. Researchers for all these disciplines are included in the project as partners². In this project especially researchers were the target group.

¹ In the second phase also air quality is included

² The partners in the project are: Wageningen UR (University & Research centre), Deltares, VU University Amsterdam, KWR Water cycle Research Institute, TNO, KNMI

At the web portal (Climate Impact Guide (CIG)/KlimaatEffectWijzer (KEW): www.klimaatportaal.nl) available data and information are presented in a common structure on all sub portals per sector. The synchronization should make it easier for users to find information from other sectors. The sub portals are connected to each other with the help of several common web pages with among others information on the (lack of) exchange of data between sectors (e.g. models on ecosystems and agriculture often generate their own information on water supply from the soil), discrepancies and the possible consequences. For example, using land use data with a time horizon of 2040 for around 2050 may lead to a relatively small overestimation of the area with agriculture in the Netherlands.

Table 1. Examples of the type of information provided about discrepancies and the consequences.

Discrepancies	Use of climate data within other sectors	Consequences
Land Use	Projections for future land use for 2040, impact studies often for 2050	Changes in land use during 10 years are often not large, but some over/underestimation possible
Water	Makkink reference evapotranspiration, other sectors use sometimes other methods for evapotranspiration	May lead to other values for actual evapotranspiration, and therefore to over/underestimation of water demand, drought and water excess.

For tailoring regular or constant contact with users is required, since users can not always specify their requirements directly and their requirements may change over time (Bessembinder et al., 2011b). In this project the nature of the tailoring activities per discipline differs considerably:

1. improving access to available data: information is given on which data are available;
2. processing of available data;
3. tools for making/selecting specific data;
4. guidance on the use of data.

The first two activities were executed by all partners, but the others not.

2.2 Integrated data set

When impact researchers use different climate scenarios, land use scenarios and time horizons, it becomes more difficult to integrate the results of the various impact studies. Consequently, it also becomes more difficult to draw conclusions relevant for policy makers from it. For hydrology, agriculture and nature the required climate data do not differ very much. Therefore, climate data sets will be gen-

erated that can be used by all three disciplines. When these disciplines also use the same land use scenarios and time horizon (2050), an integrated dataset can be developed for climate and impacts that can be used as a reference. The synchronization of the use of scenarios is part of the second phase of the project. A first version of climate datasets is now developed and will be used in the coming half year by the impact researchers.

2.3 User consultations

The added value of the CIG/KEW portal depends on the usefulness of the provided data and information for the intended users. The main aim of this project is to improve the access and usability of data and information on climate change and its impacts for users. For this, user feedback and knowledge of users' requirements is essential (Bessembinder et al., 2011a). Therefore, different forms of user consultations are organised:

1. workshops/meetings with larger groups of users: e.g. to find out which information users need;
2. evaluation: the pilot version of the web portal was reviewed by 30 users in the beginning of 2011. The results confirmed the need for more overview on available data and information. For 38% of the reviewers it was already easier to find data and information, 48% mentioned that the portal did not yet contain enough data and information. The most important points of improvement are the further synchronization of the web pages of the different sectors and adding more information and overview;
3. the project partners themselves are users of some of the information from other partners. Discussion on the needs, assumptions, discrepancies, etc. among each other resulted in a better understanding of each others requirements.

3 Preliminary conclusions and discussion

3.1 Synchronization of sub portals

At the moment the structure of the sub portals still differs to a certain extent. For some of the intended users (researchers) the current structure makes it already easier to find similar information for various disciplines. It seems not easy to use a similar structure for each discipline. This is partly due to the different nature of the data and information that is presented: some present data and information that stem from individual projects (e.g. for nature and agriculture), some present data-bases with long term obser-

vations (e.g. for climate). In some cases the results of models can be made available through internet (e.g. for water and land use), in other cases this is not possible. Sometimes it seems better to present information on uncertainties together with the description of the model components (e.g. for nature), sometimes a summary of the uncertainties can be given on the separate web pages (e.g. for climate). After comparison of the subportals by the project team, several suggestions were made to improve the synchronization (move part of the texts/data, include more links, etc.), without disregarding the specific aspects of the various disciplines. In the second phase these are implemented.

3.2 Overview of available data and information

The sub portals in the CIG/KEW give an overview of, especially, the results of projects executed within the Dutch Climate changes Spatial Planning (CcSP) and KfC projects. It is difficult to give a complete overview of all research and data on climate change and climate change impacts in the Netherlands and outside. The CIG/KEW focuses especially on the Netherlands and the river basins of the Rhine and Meuse, since this area is considered most relevant for the water management of the Netherlands. We realize that for e.g. nature and agriculture larger areas also may be interesting. As the result of the review of the pilot version of the web portal, we are now working on including a short overview of the research organisations per discipline in the Netherlands and to include an overview of the most important international organisations and/or projects per sector.

During the review also some policy makers were asked to review the pilot web portal, although the intended user groups are researchers. From the reactions it became clear that a portal that is developed for researchers is not automatically the most useful for policy makers. In general, policy makers need different types of information than impact/adaptation researchers. Summaries of the information on this CIG/KEW portal may be useful (as the basis) for information for policy makers.

3.3 Dealing with uncertainties

When people talk about climate change, always the issue of uncertainties pops up. There are considerable differences in the way uncertainties are described and dealt with between disciplines. Therefore, “uncertainties” is included as a separate entry in the menu on the web portal. In the description of the various types of uncertainties per discipline it is tried to use the typology as presented by Walker et al.

(2003). In most of the descriptions now explicitly a distinction is made between input uncertainties and parameter uncertainties. Comparison of the web pages by the project team also resulted in some suggestions for more streamlining of the description of uncertainties. In the second phase of the project an autumn school was organized in October 2012 on “Dealing with uncertainties in research for climate adaptation”. The aim of this autumn school was, among others, to create more understanding of the various ways of dealing with uncertainties between the various disciplines and to start creating a “Common Frame of Reference”³. Information from this autumn school will also be included on the web portal.

4 References

Bessembinder, J., B. Overbeek, C. Jacobs, P. Reidsma, B. Schaap, J. Delsman, J. Verboom, P. van Bodegom en J.P.M. Witte, 2012. Tailoring information about climate change and its impacts. Synthesis report Knowledge for Climate, project KKF-01C.

Bessembinder, J., B. Overbeek en G. Verver, 2011. Inventarisatie van gebruikerswensen voor klimaat-informatie [Inventory of requirements of users of climate information]. KNMI-publication TR-317, pp. 45.

Bessembinder, J., B. Overbeek, B. van den Hurk and A. Bakker, 2011. Klimaatdienstverlening: maatwerk [Climate services: tailoring]. Synthesis report Climate Changes Spatial Planning project CS7.

Walker, W.E., Harremoes, P., Rotmans, J., Van der Sluijs, J.P., Van Asselt, M.B.A., Janssen, P., Kreyer von Krauss, M.P., 2003. Defining uncertainty a conceptual basis for uncertainty management in model-based decision support. Integrated Assessment vol. 4 (1).

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³ All presentations, background information, the Common Frame of Reference, etc. from this autumn school can be found through: <http://www.knmi.nl/climatescenarios/autumnschool2012/index.php>.