

Societal aspects

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1. Relevance of the research programme for national and regional adaptation policies

There are still substantial gaps in our knowledge on how to make the Netherlands 'climate proof'. An international review (Koetse and Rietveld, 2009) reveals that in particular in the fields of transport networks and other infrastructures, research on adaptation to climate change has been lagging behind.

Planning infrastructure networks and their associated maintenance as well as the implications for land use require a long term perspective. This means that it is essential that possible future developments on the context in which infrastructure will operate will be taken on board. There is already substantial experience with taking into account economic, demographic and spatial developments, but possible implications of climate change have not yet been incorporated in planning procedures. The present programme will contribute to filling this gap.

The proposed research will focus on the mainport region Rotterdam-Rijnmond. This region forms a substantial part of the economically most important area in the Netherlands: the Randstad (the area in the triangle Amsterdam – Rotterdam – Utrecht). Given the open economy of the Netherlands, its specialization on trade and its position as hub in international energy and transport networks the mainport regions are of significant economic relevance within the Netherlands and in international transport networks. Large investments of a spatial (public) and industrial (private) character are expected in those regions in the next decades. In addition to being part of the economic centre of the Netherlands, the mainports are located in coastal regions, in a river delta and below sea-level. This makes them relatively vulnerable to climate events such as floodings. The combination of being important from an economic perspective and vulnerable from a climate perspective emphasizes the relevance of the geographical scope of the programme.

National and regional adaptation policies are aimed to make the spatial organization of the Netherlands (or a specific region) robust to climate change. This research programme will contribute to this goal thereby adopting a demand driven approach, which means that institutions in 'the field' (the stakeholders) deliver input in this programme by means of (research) cases. The stakeholders are the municipality of Rotterdam, the Port of Rotterdam, ProRail, Waternet, Rioned and the Ministry of Transport and Water Management and they are all confronted with spatial planning problems with respect to climate change. For example, the Ministry of Transport and Water Management is interested in the effect of a potential change in wind direction on the spatial distribution of noise around Schiphol as this may affect land use around this airport.

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In cooperation with the consortium the stakeholders have formulated such research questions which are incorporated into the project descriptions of this proposal. This guarantees that the eventually developed adaptation strategies (in WP1) will satisfy the stakeholders' knowledge needs. The formulated adaptation strategies will then contribute to a climate robust spatial arrangement of the Netherlands.

The research programme will provide the stakeholders involved in planning, design, maintenance, and/ or operation of infrastructures, both on national and on regional levels, with both qualitative and quantitative information on threats and risks that infrastructure systems are facing. It will provide a focused and justified awareness at public, private and policy levels and establish the urgency of adaptation measures in view of the costs and benefits involved. The programme will result in a better understanding of infrastructure vulnerability related to climate change. This will help policy makers to set priorities. Combined with a comprehensive set of short-term and long-term adaptation measures, adaptation strategies can be formulated and a roadmap for actions and timing will be developed for each hotspot.

Of special relevance is the uncertainty on climate change effects, both concerning its locale as well as its magnitude: our climate is a system that exhibits chaotic behavior. Weather patterns and temperature are expected to change in the long run. One way of dealing with inherent uncertainty is by making use of scenarios. However, probabilities of occurrence cannot be attached to scenarios. This calls for adaptive approaches to infrastructure investments where flexibility is an important element. It is this type of adaptive approaches that will be considered in the present programme. Such approaches are relevant to avoid two major potential problems:

1. A waste of resources in the form of overinvestment.
2. A lack of proactive measures to be prepared in case rapid climate change would take place e.g. due to tipping of the complex, chaotic climate system. This not only requires technical and infrastructure system innovation and new network concepts, but also concerns the governance of infrastructure: the institutional environment should be prepared in time for climate change in order to be able to act quickly in case of rapid climate change.

2. Involvement of stakeholders

The end users of the results of the program are the main hotspots involved (Rotterdam), the main co-funding parties (Ministry of Transport, Waterways & Public Works, the water services company Waternet and the railways infrastructure authority ProRail) and third parties for whom the research is of relevance (for instance road managers within local authorities, water services companies and administrators of gas and electricity infrastructures). It is expected that with the program progressing, a wider group of stakeholders will be interested in participation and in a more active involvement, due to increasing awareness on climate issues and to increasing availability of practical deliverables. Also, the stakeholder involvement will evolve during the course of the project from an emphasis on the impact of climate changes, into an emphasis on measures and adaptation strategies and an emphasis on applicability and implementation of these strategies within the own organizations. An active stakeholder participation can be assured by tuning the strategy to involve stakeholders to these changes.

The involvement of these stakeholders is organized through different channels and on various levels of scale: through a national user group, through conferences and workshops and through the individual projects. The national user group will reflect on the applicability of the results in practice on a program level. It will give its advice on how to increase the practical relevance of the program and its projects. Through conferences and workshops stakeholders and researchers interact on a more substantial basis. This interaction will provide the researchers with emerging questions from practitioners and with necessary feedback on the practical relevance of their intermediate results. This interaction is crucial to assess necessary conditions for the implementation of the results in everyday practice. The participation of stakeholders in the workshops will help to develop the systems model and the adaptation strategies for different case studies. Within the individual projects, researchers will contact the stakeholders on a less organised basis with requests for information and data on their infrastructures. In order to fulfil the initial central research questions, input from stakeholders in terms of data and information is crucial to the programs success.

Stakeholder involvement has started much earlier through previous involvements of the research groups in application oriented research in a wide range of contexts. The research groups have ample experience in stakeholder communication at strategic, tactical and operational levels and in linking scientific research and application. The groups involved already have long-standing relationships with hotspot Rotterdam, Amsterdam e.g. through the Port/TUD Joint Research Centre, NGI, Transumo and the first phase of the Adaptation for Climate program. During the writing of this proposal co-funding parties and hot spots, identified specific questions and compared their climate agenda's (such as the Ministry's national action agenda for climate change from the Dutch Ministry of Transport) with the research questions in the proposal. The consortium therefore pursues a research program with strong relations to specific stakeholder questions. Starting this programme, stakeholder involvement will first be organised officially through a conference mid 2010. This conference will focus on the impact of climate changes on infrastructures. The conferences are to be repeated yearly with a shifting focus from impact, to adaptation strategies to the implementation of these strategies. The user group will meet once a year, as much as possible combined with meetings already part of the research program (for instance the conferences).

Apart from the programme level conferences, workshops will be organized by individual work packages and projects and cannot specifically be identified at this moment. For WP1 meetings will take place on the formulation of specific themes to be addressed and the formulation of adaptation strategies to be considered. In WP's 2 and 3 workshops will be organized to identify the key operational and development issues, drivers and concerns. Hotspot representatives will be consulted on the specific goals and functionality of the models developed and the scenarios to be explored. In WP4 within these workshops the types of socio-economic effects that are considered to be relevant to the stakeholders in their adaptation strategy and that deserve focus in the execution of the research projects will be discussed.

3. Knowledge transfer and valorisation

The proposed research programme aims at dissemination of the results both to a scientific audience and to various societal actors, including the broad group of stakeholders in the hotspots appointed by Knowledge

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for Climate: local, regional, national and European government agencies and NGO's, the water distribution and management sector, as well as the infrastructure and service providers.

Valorisation of results of the project will occur in different arenas:

- ▽ Research development: Our aim is to develop INCAH from a national programme towards an international center of excellence in the next four years. As INCAH is only a first (though necessary) stepping stone for this, substantial support is required from research funds that fall outside the reach of Knowledge for Climate. With a view to the increasing co-operation between national and European institutes (the EIT, the Joint programming Initiatives and the KIC's) the consortium will strengthen linkages with the international partners around INCAH, and participate in various supplementary research initiatives.
- ▽ Infrastructure development and maintenance: through the participation of the main authorities for road and rail infrastructure development and maintenance in INCAH (Rijkswaterstaat and ProRail, respectively) new concepts and design strategies will be developed that can be followed up by focused R&D and implementation. Both organizations and the consortium members have access to public funding for R&D and close links to the private companies in this field. TNO and Deltares have a special infrastructure for publicly funded, SME oriented R&D projects, which also allows them to establish new ventures quickly.
- ▽ Policy design and policy support: For policy makers, the climate adaptation agenda is very volatile and sensitive to actual and local political programs. The opportunities for raising the robustness of our infrastructure networks are abundant however, even without high additional costs. At the same time, few policy circles have adopted this agenda yet in the objectives and strategies of their organizations. Raising the awareness among potential stakeholders, beyond those already involved, will be a major challenge of INCAH, with a high expected pay-off. We reserved a limited part of our budget to articulate and answer questions from stakeholders, also maintaining the possibility for consultancy services beyond INCAH.

The scientific results will be presented at international conferences and published in research reports and high quality, peer reviewed scientific journals, both in the climate field and the infrastructure/networks field. We mention in particular the 'Journal of Transport Economics and Policy', 'Transportation Research' parts A, B, D and the Journal of Geotechnical and Environmental Engineering. These journals are well known internationally and will therefore reach a large scientific audience. The international exposure will further be extended through the collaboration with our international partners.

In addition to knowledge dissemination within the scientific community, we emphasize the translation of the scientific results into practical applications and support the implementation of adaptation measures and strategies. The knowledge institutes TNO, Deltares and KWR play a key role in this process each in their own domain. They will disseminate research results through their existing networks and collaborations with various stakeholders, to bridge the gap between science and practice.

More specifically, a platform will be created where researchers and practitioners have a dialogue concerning adaptation for infrastructure and networks. All stakeholders will be involved to make sure that conditions for implementation and support can be assessed. In addition, stakeholders will be able to

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respond to intermediate results of fundamental research that is taking place in the various WP's. Policy makers and stakeholders from other countries will also be invited to participate in this dialogue.

Outcomes which are specific for a particular infrastructure or network type will be presented in specialist magazines and specialist newspapers of importance for the Dutch clients of this work (e.g. 'Schuttevaer' for inland waterways transport). Other examples are Tijdschrift Vervoerswetenschap, Civiele Techniek and Land+Water. Also publications in more general media like regional and national newspapers and broadcasts on radio and TV are foreseen.

The consortium members have strong networks, that will be used as channels for knowledge dissemination. Examples are ECCONET (Effects of Climate Change On the inland waterway Networks), ECTRI (European Consortium of Transport Research Institutes), the GRA (Global Research Alliance, about 45000 researchers), COST (Intergovernmental framework for European Cooperation in Science and Technology), ELGIP (European Large Geotechnical Institutes Platform), PIARC (The World Road Association), ISSMGE (International Society for Soil Mechanics and geotechnical engineering), and the Dutch CROW (National Information and Technology Platform for Transport, Infrastructure and Public Space), CUR (Civieltechnisch Centrum Uitvoering Research en Regelgeving) and COB (Centrum Ondergrond Bouwen).