

Societal aspects

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

This KfC research programme explores the extent to which the Dutch long-term strategy for fresh water resources management is adequate, sustainable and how it can be improved. The basic societal relevant question that have to be answered are:

- ▽ To what extent of climatic changes can we sustain a profitable and ecological sound land use, within the low lying areas of the Netherlands threatened by increasing salinisation, droughts and soil subsidence?
and subsequently:
- ▽ What adaptation actions should be taken, given the projected climate and societal changes and associated uncertainties?

This KfC research programme provides knowledge and insight on the performance of different strategies in order to support main political choices on a national and regional level like: "should there be a shift to more regional self support of fresh water supply?", and if so, "can we reach this best by improving water management, using technological solutions or by changing land use?" The results will in this way support the preparation of robust and flexible investment strategies on national and regional level to enhance the freshwater availability.

The main policy framework in the coming years is the Delta programme that has two main objectives: how to reach a climate proof water safety and how to reach a climate proof fresh water supply in the Netherlands. The ongoing applied research project on fresh water supply within this Delta programme (in Dutch project 'Verkenning Zoetwatervoorziening Nederland') is carried out by Rijkswaterstaat (Waterdienst) and Deltares, using large models that assess the effects of climate and adaptation options on national and regional scale. Complementary to this applied research project this KfC research programme adds in-depth, innovative and exploratory research on promising adaptation strategies starting from the local and regional scale. It is expected to yield new insights which cannot be foreseen

beforehand. It is on this point that our proposal intends to make a difference in order to provide additional relevance for regional and local adaptation policies.

Many efforts are currently undertaken to embed adaptation strategies into regional development projects, the current corner stone of Dutch spatial planning. This gives the opportunity for tailor-made solutions for optimizing freshwater availability. However, this regional approach has some drawbacks too. For example, the transfer of burdens from one region to another. Therefore in this KfC research programme the question is always ask how a regional strategy relates to neighbouring regional and national approaches. This is also expressed in the three integrated cases (WP-6) provided by the programme. There is one supra-regional case ('Groene Ruggengraat') which considers and counterweights all stakes, policies, regarding optimizing fresh water supply and demand within an area covering parts of three provinces and there are two more regional cases ('Haaglanden', 'Zuidwestelijke Delta') in which a regional strategy aimed at more self support is explored opposed to strategies that rely more on external supply of fresh water.

The three cases provide direct relevance for regional adaptation policies. Partly these policies are directly connected to the regional projects within the Delta programme i.e. South-West Delta (case 'Zuidwestelijke Delta') and, Rijnmond and Drechtsteden (cases 'Haaglanden' and 'Groene Ruggengraat'). Further input will be generated to support water management plans from the provinces of Zuid-Holland, Utrecht, Noord-Holland and Zeeland and relevant water boards (i.e. Beleidsvorming Droogte Groene Hart/Zuidvleugel Acuut, Ruimtelijke Consequenties van het droge klimaatscenario in 2050, Droogtebestrijding Groene Hart – Geen spijt maatregelen verandering zoetwatervraag).

This KfC research programme does not start from scratch. New concepts for climate proof freshwater resources management have been introduced in national policy programmes such as the National Water Plan (NWP, "meebewegen als het kan, weerstand bieden als het moet") and the ARK programme (a climate adaptation policy programme focusing on spatial planning). On-going and recent research (e.g. "Meta-studie Zuidwestelijke Delta", "Waarheen met het Veen", "Droogtestudie Nederland", "Klimaatbestendigheid NL Waterland", "Leven met Zout Water") provide (applied) science to underpin climate proof fresh water management on different scales on which this programme builds upon. Several consortium partners (in particular Deltares, Alterra and KWR) are and were intensively involved in these programmes, which should ensure that the consortium can identify those research questions, which are not yet addressed in on-going research.

2 Involvement of stakeholders

Stakeholder involvement in the initial process of formulation of this proposal

In the initial phase the research agenda for this project was formulated in dialogue with involved scientists, provinces (Zeeland, Zuid-Holland, Noord-Holland, Utrecht), water boards (Schieland en de Krimpenerwaard, Delfland, Rijnland, Brabantse Delta) and other stakeholders (Rijkswaterstaat, LNV and ZLTO),

Financing of the research by stakeholders

Many project activities will be co-financed by regional and national policy institutions as well as private institutions (Stichting Natuurmonumenten, STOWA), up to approximately 15-20% contribution in the total research costs. In addition 10-15% of the total budget include synchronizing on-going R&D activities of stakeholders (ZLTO, Brabantse Delta) with our proposed research.

WP-6 Collaboration with on-going activities of stakeholders

Tuning of planned research activities with on-going stakeholder activities in the field of fresh water resources management is a responsibility for WP-6. Stakeholder meetings in WP6 will be tuned with the agenda of the Delta programme, in particular sub-programme 'Freshwater Resources' and sub-programme 'Southwest Delta' with the relevant project leaders of V&W, LNV and programme Office Southwest Delta.

The case climate proof, and sustainable water use in the south western Dutch Delta area will focus on (1) water storage at the local scale and (2) water management at the regional scale. For the first component there will be a parallel 'in practice' project executed by the local agricultural organisation (ZLTO) in which researchers of this KfC research programme will part time participate. For the second component there will be a parallel with the planned pilot project in the Zuidwestelijke Delta executed under the national Delta program.

In the case 'Haaglanden' a joint learning environment ('leertafel') is organized in which stakeholders and researchers work together on more practical questions. These activities will be done in co-operation with Water Framework Haaglanden. This is a cooperation between the water authority, Delfland Water Board, the Province of South-Holland and the City Region of Haaglanden with its nine municipalities.

The case 'Groene Ruggengraat' geographically lies within the "Groene Hart". Recently a study issued by all provinces and waterboards related to the "Groene Hart" has started in which the water-demand and no-regret measures to reduce this demand in a number of pilot areas is assessed. From this assessment a number of questions will come forward requiring more in depth research from our KfC research programme. In addition we aim to tune stakeholder interactions that are being planned in the context of 'Uitvoeringsprogramma FES Westelijke veenweiden', 'Uitvoeringsprogramma Randstad 2040: inrichting van een Groene Ruggengraat' and the KfC programme. This tuning will be done with programme office Groene Hart (www.groene-hart.nl), Laag-Holland (www.laagholland.nl) and project Hollandsche IJssel (www.schoner mooier.nl).

WP-6 Process management of stakeholder involvement

During the execution of the research programme the interaction between the stakeholders and research activities within the other work packages will in particular be organized through WP-6 in the three integrating cases: a. Case 'Haaglanden', viz. "Improving regional self support of Greenhousing and Industry in the Westland area"; b. Case 'Zuidwestelijke Delta', viz. "climate proof, and sustainable water use in the southwest Dutch Delta area" and c. Case 'Groene Ruggengraat', viz. "combined adaptation for agriculture and nature in the 'Groene Ruggengraat'".

For each case study a working group and steering group (waterboards, provinces) will be created consisting of relevant project leaders of WP1-5, stakeholders and key persons in relevant science-policy interfaces. This working group is responsible for tuning stakeholder interactions (workshops, interviews, surveys) between the involved researchers and stakeholders. In addition the 3 chairs of the working groups meet frequently to tune proposed stakeholder interactions within and outside this research programme. More specifically, we shall organise meetings and workshops, where the research team and the stakeholders can discuss the objectives, the approach, the specification of research questions, etc., as well as any preliminary results and their applicability for each case study. In addition researchers will be working partly on location at the office of relevant stakeholders (province, water board).

Approach in the stakeholder workshops within the case studies

In the 3 working groups of the cases joint fact-finding (Eerman and Stinson, 1999) between involved scientists and practitioners and policy makers will be stimulated. In short, employing joint fact-finding means addressing a factual dispute by forming a single fact-finding team comprised of experts and decision-makers representing both sides of the dispute. The factual dispute(s) to be discussed in the workshops is built upon the main objective of the research proposal, the aim to find solutions for the growing mismatch between freshwater supply and demand in the short-(2015) and long term (2050/2100). Amongst others, disputes to be discussed are:

- ▽ The level of (dis)agreement about the sense of urgency to tackle this issue (problem framing)
- ▽ Water demand management versus water supply management (costs and benefits)
- ▽ The (perceived) level of 'no-regret' of proposed strategies/measures on case study level
- ▽ Resilience approach versus Robustness approach (in co-operation with WP-5)

Lessons learned in the field of 'action based research' will be embedded into our approach in case study 'Haaglanden' in collaboration with KfC theme 7 (Erasmus University, Arwin van Buuren).

Objectives en approaches of planned surveys and interviews

In collaboration with WP1 (, KfC project " Negotiating uncertainties: defining climate proofing and assessing associated uncertainties in the Southwest Delta Region of the Netherlands" and KfC theme 3 (Rural Areas) consultation of stakeholders (interviews, internet surveys) in fresh water resources management are planned in collaboration with TNS-NIPO and ZLTO. The general objective is to assess how resilient individual agricultural entrepreneurs are regarding economic drought and salinity damage and how they deal with uncertainties. The results are used for Agent-Based modelling (KfC theme 2), Exploratory Modeling/Analysis (WP-5) and guidelines for dealing with uncertainties in negotiating processes (KfC project Negotiating Uncertainties in collaboration with WP5).

Stakeholder involvement on programme level

For the project as a whole a steering group will be installed that will represent the national, regional and local water managers and policy makers from the hotspots. The steering group will advise the programme management on the link between the actual issues they are facing with respect to guaranteeing freshwater availability and the research that will be carried out in this theme 2.

It is further expected that for specific projects separate guiding groups will be organized within the framework of the steering group.

3 Knowledge transfer and valorisation

From research to practice and policy

By the process of joint fact finding and tailoring of adaptation strategies in cases described under 4B an important part of the valorisation of the results is reached. By means of overlap in personnel and by participation in mutual workshops there will be a regular exchange of information and results between the research programme and the Delta programme project fresh water supply. This programme intends to organize a joint 'fact-finding' workshop together with stakeholders and 'investors' to ascertain that there is consensus regarding the primary questions that have to be addressed and to discuss the relationship between those primary questions and the disciplinary and interdisciplinary scientific issues that are formulated in this proposal. This workshop is organized in the first months of the program 'Climate proof fresh water supply'.

From research to other stakeholders

A user community will be established around the project. Once a year a workshop will be held to communicate latest results and to get feed back from stakeholders outside the areas directly under study. In these workshops also consultants involved in parallel projects are invited to exchange experiences. Twice a year the user community will be informed about latest results, relevant developments etc., by means of a newsletter.

International hotspots

In the framework of the Delta Alliance and together with other research themes we will participate in activities (research proposal international hotspots, capacity building) to promote and transfer the Dutch Knowledge to other low lying deltas. It is very likely that other geographic regions, such as the Mediterranean area or the Indian or Chinese coasts, but also the international hotspots, will be subject to similar or even higher impact effects of climate change on society. This offers several opportunities to broaden the scientific perspective of this program and to attain synergy with international research calls, such as from EU, FAO, and other international frameworks such as UNESCO. In particular, the 'Young Professional Network' provides opportunities from all sides for synergistic cooperation. This may be shaped in the form of summer schools, joint integrative papers, (hand)books, and protocols, and other network activities, as well as new joint proposals.

From research to research

There are 7 PhD projects in the research proposal. Each of these project will have to generate about one scientific reviewed paper each year. The role of our foreign research partners is not only to safeguard scientific excellence of research but also vice versa the results obtained in the project are shared with them. Researchers involved will visit international conferences. On the coming KfC conference "Deltas in Times of Climate change" we intent to organise a workshop on the issue of fresh water supply. Our foreign partners in the project will a.o. be asked to contribute. Near the end of the programme a second

international workshop is foreseen.

In order to enhance interdisciplinary skills of the seven PhD researchers a summer-school will be arranged in cooperation with the involved international partners. This summer school has three objectives (1) exchange knowledge across the involved disciplines regarding climate proofing fresh water supply and demand, (2) improve academic skills to publish interdisciplinary papers and (3) to cope with scientific uncertainties and negotiation processes between science and policy about climate proofing fresh water supply and demand. We hope that the summer school will result in a multi-author paper either for a scientific public and/or a broader audience.

Other

The project is assigned a KfC Website on which a popular description of the project, an agenda of activities, relevant publications and the aforementioned newsletter will be available. The results of this project can be disseminated internationally through various networks in which the consortium partners are involved. For example, (KWR) is secretary to the IWA Specialist group on Climate Change. IWA is the leading global organization of water professionals. Deltares is member of the UNESCO-GRAPHIC group (Groundwater Resources Assessment under the Pressures of Humanity and Climate Changes), is partner in EU several Interreg IVB North Sea Region programmes and Wageningen UR is involved in a cluster of EU funded projects dealing with global change, climate adaptation and water cycle (ADAM, WATCH, SCENES, AQUASTRESS, NEWATER, SoilCAM, Carbo-North) and the co-operative programme on water and climate.