

Scientific aspects

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1 Description of the research programme

1.1. Problem definition, aim and central research questions

There is increasing recognition of the need for society to adapt to the impacts of climate change (IPCC, AR4). Adaptation focuses on anticipating these impacts in three ways: minimizing potential damage; coping with the consequences of impacts; and taking advantage of opportunities. With its differentiated and high-value economic activities, its high population density and large parts of the delta lying below sea level, the Netherlands is exposed and sensitive to climate change impacts. Consequently the ambition of climate proofing the Netherlands, and the different regions within it, is high on the political and societal agenda. Addressing climate change problems is far from easy and has been called the 'wicked problem par excellence' (Davoudi, Crawford, & Mehmood, 2009; Jordan, Huitema, Asselt, Rayner, & Berkhout, 2010). The Dutch Knowledge for Climate programme has specified a limited number of areas that are especially vulnerable to climate change impacts. In these eight hotspots, knowledge institutes, governments, and businesses develop knowledge about adaptation options and examine their feasibility.

Adaptation to climate change raises important governance issues (Adger, et al., 2003; Jordan, et al., 2010; Nieuwaal, Driessen, Spit, & Termeer, 2009). Climate adaptation involves technical adjustments, like raising dikes or creating water storage, but it also calls for broader processes of societal change and transition. Much adaptation will be the result of the actions of private actors, referred to as autonomous adaptation (Berkhout, Hertin, & Gann, 2006). Other aspects of adaptation have public good characteristics requiring collective action. Furthermore, people expect governments to safeguard them from flood, drought, and the health effects of climate change. In this programme we define governance as the interactions between public and/or private entities ultimately aiming at the realization of collective goals. This broad definition comprises governing activities of government, businesses and civil society actors; and encompasses

economic, communicative and juridical steering mechanisms. A governance arrangement is defined as the ensemble of rules, processes and instruments that structure interactions between actors for a specific domain or issue (Arts & Leroy, 2006). This concept will be used for both analysing existing and designing new arrangements.

This 'Governance of adaptation to climate change' programme aims to generate a creative link between the practical governance issues in the hotspots and theoretically-informed analysis. It will assess governance arrangements that could strengthen adaptation in the eight hotspots and in international case studies, and draw lessons for governance of adaptation more broadly. In our view good governance of adaptation should be (a) legitimate, i.e. ensuring transparency, accountability, fairness and equity (Alexander, 2002), (b) effective, i.e. address the adaptation task decisively and efficiently through the right mix of norms, instruments, strategies and processes; and (c) resilient, i.e. both enabling autonomous adaptation and building long term adaptive capacity (Arvai, et al., 2006; Olsson, et al., 2006). We argue that it does not suffice to apply existing insights from governance literature to the issue of climate adaptation in an instrumental way only. The specific complexities of the governance of adaptation call for development of new advanced governance knowledge (Nieuwaal, et al., 2009).

Three general challenges will affect the governance of adaptation. First, important changes in local, national and European governance systems are unfolding. Governance today includes a variety of actors at different scale levels (Lister, 2001; Teisman, Buuren, & Gerrits, 2009). This multi-actor, multi-sector and multi-level governance world forms the inescapable context for climate adaptation. Although these networks are often referred to in a negative sense, in terms of fuss or delay, they also provide the social capital to enable climate adaptation. A confounding complexity is that climate vulnerabilities are often not easily separable from economic or social vulnerabilities and therefore need to be linked to other societal sectors (Tompkins & Adger, 2005).

Second, climate adaptation lacks a well-structured policy domain and practice. Adaptation is an emerging policy field with, at least for the time being, only weakly-defined ambitions, responsibilities, procedures, routines and solutions. As a result, a series of basic dilemmas have to be (re)addressed in developing the governance of adaptation (Haug, et al., 2009):

- ▼ what problem to address and how to frame it
- ▼ what levels to act at
- ▼ how to act and which instruments to use
- ▼ when and in what sequence to act
- ▼ who wins and who loses
- ▼ how to deliver policy results

Third, decision-making in relation to climate change is knowledge-intensive. Without systematic observations and mathematical models, awareness of climate change would be limited (Siebenhüner, 2002). But important uncertainties about the nature and scale of risks and the effectiveness of solutions will persist (Arvai, et al., 2006). In addition, the many actors involved bring with them a variety of perceptions

leading to fundamental controversies. In spite of these inherent uncertainties, decisions about adaptation strategies need to be taken or prepared now (Burton, Bizikova, Dickinson, & Howard, 2007) However, short-term interventions based on a long-term vision demand a specific commitment by taxpayers, politicians or residents.

In sum, the governance of adaptation challenges existing structures and routines, and cuts across the usual boundaries between administrative scales, between policy domains, between the public and the private sector, between the known and the unknown, between collective and individual responsibilities, between science and policy and between the long and the short term.

The eight hotspots are actively trying to address these challenges in concrete projects and strategies. Their practical puzzles and dilemmas can be summarized in four concepts, which serve as the basic architecture for this research programme.

- ▽ *Organizing connectivity* refers to bringing actors, issues, sectors and scale levels together to realize creative climate adaptation options. This means taking the challenge of tailoring responses to the problems at hand, within the fragmented governance structures. This requires knowledge of designing process trajectories, organizing collaborations and partnerships, linking with related policy problems, multi-level governance and developing entrepreneurial leadership strategies.
- ▽ *(Re)allocating responsibilities and risks* refers to changing the existing governance structures by changing the allocation of responsibilities and risks between a variety of actors, in order to enable climate adaptation. It requires knowledge about clarifying responsibilities, allocating costs and benefits or creating new systems of economic incentives.
- ▽ *Dealing with controversies* concerns coping with the inherent uncertainties and varied knowledge frames, especially concerning the spatial and temporal scales at which to address climate adaptation. The challenge is to act without ignoring this variety and without paralyzing decision-making processes. It requires knowledge of methods of dialogue, learning, negotiation and co-production of knowledge.
- ▽ *Normative principles for adaptation* concerns the need for norms to evaluate autonomous adaptation and to guide the search for new forms of governance. It requires knowledge to further elaborate and implement the principles of legitimacy, effectiveness and resilience.

The programme will develop and test governance arrangements that will contribute to (1) developing and implementing adaptation options; and (2) increasing the adaptive capacity of society so that future climate changes can be confronted. It will do so by addressing the following key questions:

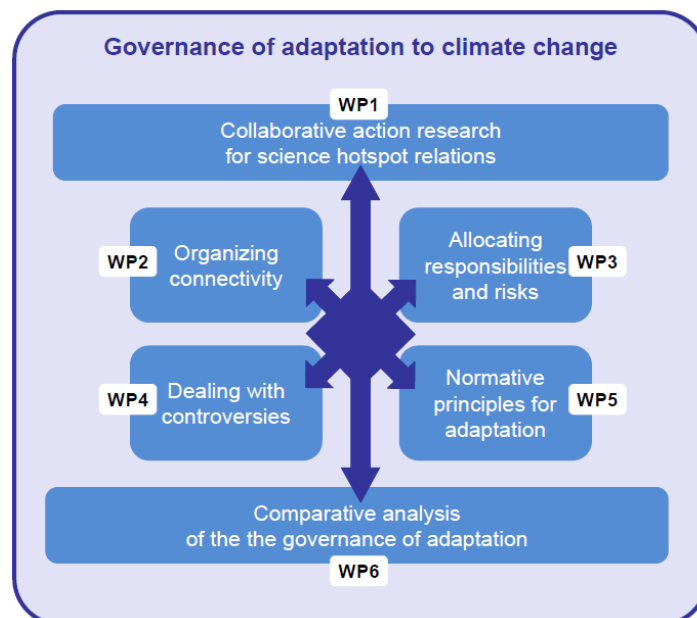
1. How can we organise connectivity within the existing structures through innovative experiments, leadership approaches and process designs?

2. Which economic instruments and governance structures to allocate risks and responsibilities between the public and the private are promising, and how can they be implemented in the Dutch situation?
3. What are the consequences of uncertainties, stakeholders' perceptions and contested knowledge, and which methods help to cope with them in decision-making processes?
4. How can the principles of legitimacy, effectiveness and resilience be elaborated and what are the implications for the governance of adaptation?

4.1. Programme outline and research approach

The programme will be organised around four substantive interdisciplinary work packages (WPs), each one addressing one of the four key questions outlined above, and supported by two methodological WPs (see figure).

The core philosophy of our research approach can be described as developing a powerful combination between practice-driven collaborative action research and theoretically-informed scientific research. Collaborative action research means that we take guidance from the hotspots as the primary source of questions, dilemmas and empirical data regarding the governance of adaptation, but also collaborate with them in testing insights and strategies, and evaluating their usefulness. Scientific quality will be achieved by placing this co-production of knowledge in a well-founded and innovative theoretical framework, and through the involvement of the international consortium partners.



To fulfil this dual ambition we will set up two methodological WPs in which all researchers and all projects participate. WP1 develops, directs and reflects upon the methods of collaborative action research. It starts up and facilitates the interactions between the researchers and hotspot actors and organises possibilities for direct consulting. WP6 will set up and conduct an international programme for comparative research and

exchange of learning experiences across regional and national boundaries. Each work package consists of two projects, except WP2, which has four projects due to the great interest of the hotspots.

1.1. Innovative aspects and scientific output

The innovative aspects of the programme are:

- ▽ Governance of climate adaptation is not only a new policy field but also a new scientific challenge for the social sciences. This unique grand interdisciplinary programme on the governance of climate adaptation will contribute to international knowledge through the development of in-depth insights, innovative methods, proofed governance strategies, instruments and structures and a comparison of adaptation efforts between Netherlands, Sweden, Germany and UK.
- ▽ Through close cooperation with hotspots, this programme will add new empirical evidence to test innovative theoretical propositions about the governance of adaptation.
- ▽ The programme also aims to apply and integrate existing knowledge from the fields of public administration, economics, political science, spatial planning, law, environmental studies and psychology to the issue of governance of adaptation. This makes it relevant to all underlying disciplines.
- ▽ The programme will contribute to the further development of collaborative action research methods.

The programme will produce a large number of scientific deliverables at the level of the individual projects, but also a number key scientific deliverables (see section 6E) that transcend and integrate the deliverables at individual project level. For the programme as a whole and for each work package, position papers will be written at the start of the project and towards the end synthesizing publications will be produced, in the form of a special issue, two international books and a number of articles.

1.2. Relevance of the research programme in an international context

Recent international economic assessments demonstrate that there are large uncertainties about climate change damage projections for the coming century. Ranges from 1-2% of EU GDP are projected for 2050, rising to 2-6% for 2100. We can conclude a number of things from these numbers. First, climate change impacts, even with relatively small degrees of warming will impose significant new costs on European society. Second, there is great uncertainty about the scale of these costs. Third, under these circumstances it is very difficult to determine an 'optimal' adaptation strategy. And fourth, while adaptation will go some way to reducing these costs, unavoidable residual damages will remain which themselves could require major economic, social and institutional adjustments. Adaptation to climate change is not only a technical issue but a complex process of societal change also. With the growing awareness of climate change impacts over the past decade, some governance research and practical learning has occurred in Europe. New research findings and practical experience are now becoming available across a number of countries, regions and sectors that are highly relevant to the Dutch case.

The 'Governance of adaptation' programme will generate new findings and outputs that link to and contribute to a wider scientific and policy debate about climate adaptation. In particular, the four main themes identified in this programme (connectivity, allocation, controversies and normative principles) will

advance the further structuration of the policy domain. For instance, one of the weaknesses of the EU policy process up to now is the lack of a normative framework within which to prioritise and evaluate policy measures and strategies. The debate about the appropriate role for different levels of government also remains unresolved in the European adaptation policy debate. There is also a need for translating compelling theoretical concepts into practical strategies. Which arrangements are conceivable, how have their different forms been experienced, what rules of thumb can be worked out to design them, and how can they be realized within the existing institutional structures? These are all core issues in this research programme. Through interactions with our international partners in the UK, Germany and Sweden, we will ensure that the two-way flow of lessons learned and findings is effectively organised. Our communications strategy will include prominent international aspects and aim at broad dissemination to a variety of audiences amongst policymakers, practitioners and scholars.

1.3. International cooperation

The following international partners are involved in this consortium:

1. **The Tyndall Centre for Climate Research**, specifically the **University of East Anglia** (UK).
Key people: Professor Andrew Jordan and Dr. Tim Rayner.
Expertise: the Tyndall Centre is the leading UK research institute for climate adaptation research and is particularly strong in the field of environmental politics, European multilevel governance and (participatory) assessment. Opportunities for exchange abound, notably with the EU funded RESPONSES project where future adaptation policies will be analyzed for various European regions. In addition, the Tyndall Centre works for DEFRA in analyzing the governance dynamics surrounding 340 concrete adaptation projects in the UK.
2. **The Stockholm Resilience Centre** (Sweden).
Key people: Dr. Per Olsson and Dr. Victor Galaz.
Expertise: the resilience centre is the leading Swedish research institute on adaptive co-management. Key concepts are adaptiveness, transitions, rapid change, and tipping points in social-ecological systems. There are many opportunities for exchange, notably with the project on “Multifunctional Agriculture: Harnessing Biodiversity for Sustaining Agricultural Production and Ecosystem Services” (2.5 million Euros), and the project “Regime Shifts in the Baltic Sea Ecosystem - Modelling Complex Adaptive Ecosystems and Governance Implications” (1.7 million Euros).
3. **The University of Oldenburg** (Germany).
Key people: Prof. Dr. Bernd Siebenhüner at the Oldenburg Centre for Sustainability Economics and Management (CENTOS).
Expertise: CENTOS developed expertise in the economic and social-science based analysis of sustainability processes, particularly regarding public policy, corporate strategies and the relation between civil society and environmental degradation, climate adaptation, and climate protection. The 10-Mio-Euro project “NordWest 2050” funded by the German Federal Ministry for Education

and Research (BMBF) provides many opportunities for exchange. As part of this project, local and regional governance processes towards adaptation to climate change are studied. The particular focus lies on learning-oriented approaches that help in adaptation projects in coastal zone management, water management and regional and spatial planning.

Our partners play several important roles in our consortium. Their roles are detailed in WP6 but can be summarized as follows:

1. Facilitation of scientific exchange between researchers from the consortium and the international partners, aiming at joint publications from a comparative perspective.
2. Facilitation of exchange between Dutch practitioners and foreign counterparts, through establishing contacts with regional stakeholders.
3. Feedback at the annual meetings of the consortium and scientific review of consortium publications.

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2 Interdisciplinarity

This research programme aims to apply and integrate knowledge from the fields of public administration, economics, political science, spatial planning, law, environmental studies and psychology to the issue of governance of adaptation. The governance of adaptation to climate change calls for such an interdisciplinary approach for several reasons. First, climate adaptation displays the characteristics of so called complex or even wicked policy problems. This implicates that simple disciplinary solutions will not suffice. Different social scientific disciplines provide different analyses and solutions. Second, it is an emerging policy field. All aspects of governance (the economic, the legal, the administrative, the psychological, the political, the environmental) need to be addressed. Third, climate adaptation belongs to the category of environmental policy problems. Environmental studies provide integrated knowledge and a large amount of methods to study environmental policy problems. The programme will elaborate on the broad experiences within this domain. Fourth, the Knowledge for Climate programme focuses primarily on spatial adaptation to climate adaptation. For this reason spatial planning is an important discipline in our programme. Finally, the implications of uncertainties and different perceptions for governance are daunting. Psychology provides interesting insights to analyze these differences and to develop interventions to cope with them.

The interdisciplinary composition of the research team manifests itself on different levels. The PhD-projects depart from one discipline, the postdoc-projects link at least two disciplines, and the work packages will be chaired by two senior researchers from different disciplines. The interdisciplinarity of the overall programme will be safeguarded through supervision of the executive council (see 4C) and through WP6, in which all researchers and disciplines participate.

To ensure coherence within the programme, each WP will, after having made an inventory of the main questions of the hotspots, start with an inception phase in which (1) two or three project partners from various disciplines, supported by the international project partners, write a position paper to create a shared and coherent research framework that fits into the general research programme and (2) work out a research agenda addressing the concrete knowledge questions of the hotspot partners and subsume these

questions in specific research projects. The two cross-cutting and integrating work packages (5 and 6) will ensure that the whole of the programme is more than the sum of the parts of the work packages.

The senior staff members of the consortium do have a specific responsibility to act as liaison between the various work packages and to safeguard their coherence. They will also organise exchange mechanisms such as bimonthly meetings with all PhD students in the programme. This will also facilitate the creation of an informal level of cohesion that will help the production of common deliverables.

In this way a sustainable knowledge structure for climate adaptation governance will be realized, anchored and applied in regional adaptation endeavours and aligned to international scientific developments.

3 Coherence between and synthesis of outcomes from the individual work packages

The proposed research programme and its work packages form a coherent whole. It has been based upon an integrative analysis of the governance of climate adaptation challenges, in which all researchers have participated. This collaborative endeavour has led to the four key questions and according work packages. This implicates that only the combination of these work packages can provide us with answers to the questions of developing and testing governance arrangements that can contribute to realizing adaptation options, and to increasing the adaptive capacity of society. To mention some examples. Without elaborate normative principles (WP5) it is impossible to evaluate the economic instruments (WP3) or leadership strategies (WP2). In depth insights in dealing with controversies (WP2) can help to develop effective multilevel and cross-sector governance arrangements (WP2) or allocating public and private responsibilities (WP3). The programme starts with writing a joint position paper about the analysis underlying the governance for adaptation research programme (Deliverable 0.A).

The two methodological work packages (WP1 and WP6), in which all researchers and all projects participate, will further support the development of integrative approaches and the achievement of coherence. They will do so by organizing exchanges between professors, seniors, post-docs, PhD's and foreign partners. Further they will facilitate the development of synthesizing products.

In the first year six position papers will be written by the work packages, to provide guiding principles for the other work packages and projects:

- ▽ Deliverable 1.A Collaborative action research: foundations, conditions and pitfalls (WP1)
- ▽ Deliverable 2.A. Organizing connectivity for climate adaptation (WP2)
- ▽ Deliverable 3.A. (Re)allocating responsibilities and risks for climate adaptation (WP3)
- ▽ Deliverable 4.A. Frame variety and contested knowledge in climate adaptation policy (WP4)
- ▽ Deliverable 5.A. Normative principles for climate adaptation (WP5)
- ▽ Deliverable 6.A. Climate governance dilemma's in the Netherlands, Sweden, UK and Germany (WP6)

In the second and third year scientific papers will be written on emerging cross-cutting themes, based on comparative analyses between work packages, regions and countries (see Projects 6.1 and 6.2).

In the fourth year the two integrated work packages will each coordinate the synthesis of the outcomes of the different work packages. Work package 1 will do so by editing a volume: Coproducing climate adaptation: a portfolio of collaborative actions experiments in Dutch climate adaption policy. Work package 6 will lead the publication of a book that highlights the overall results of the regional and international comparative analysis, and a special issue that addresses cross-cutting themes in the governance of climate adaptation.

4 (Expected) cooperation and coherence with other research themes

The governance theme has linkages with all other Knowledge for Climate themes. The problem domains of water safety, freshwater supply, rural areas, urban areas and infrastructure and networks, will be central in our programme. We will organize cooperation and improve coherence in the following ways:

1. Synergy has been sought with climate adaptation projects that are set up by the other themes and that explicitly have an important governance component. This includes the following projects:
 - ▽ Theme 2, WP5: Decision making under uncertainty: finding a robust and flexible fresh water supply strategy. There will be a close cooperation with our WP4 (Dealing with controversies) and WP5 (Normative principles for adaptation: legitimacy, effectiveness and resilience)
 - ▽ Theme 3, WP3: Climate change and adaptation for agricultural systems. There will be a close cooperation with our project 3.2 (Implementing climate adaptation policies: Public choices and private initiatives).
 - ▽ Theme 6, WP3: Climate scenario development: Assessment of uncertainties. There will be a close cooperation with our project 4.2: (Science-policy arrangements at regional scale: how to warrant scientific requests and social robustness).
 - ▽ Theme 8, WP3. Interactive development of spatial adaptation strategies. There will be a close cooperation with our project 4.1 (Dealing with climate adaptation frames) .
2. In a number of hotspots we will generate synergy through choosing integrated case studies or integrated case areas with other themes. These include:
 - ▽ Theme 1: Integrated case of delta dikes. Case study for our project 2.2 (Realizing climate robust multifunctional land use through system synchronization).
 - ▽ Theme 2: Integrated case in Hotspot Haaglanden: Water retention in Het Nieuwe Water. Case study for our project 2.2 (Realizing climate robust multifunctional land use through system synchronization). Integrated cases Zuid-Beveland. Case study for our project 2.4 (The multilevel governance of climate adaptation)
 - ▽ Theme 3: Integrated case: Deltaplan Dry Rural Areas. Case study for our project 2.2 (Realizing climate robust multifunctional land use through system synchronization) en project 2.3 (Leadership strategies)
3. Theme 4, WP4 (Governance and Adaptive Capacity in cities and metropolitan areas). With this theme we have made arrangements to prevent overlapping research. They will focus on planning

tools in specific urban areas (districts, buildings) from a spatial planning perspective. In our research we will use insights from a variety of disciplines (public administration, environmental sciences, economics, law) to think about the governance of adaptation in general.

4. Through our collaborative action research method we will become engaged in many projects in the diverse hotspots. In all these concrete situations we will search for collaboration with researchers of the other themes, involved in these projects.

5 Connection to finalized and current projects in KfC and other research programmes

Among the first phase Knowledge for Climate projects, few address governance issues specifically. Among the the Climate changes Spatial Planning projects and the Living with Water projects, there are more governance - related projects, but because one or more of the consortium partners were involved in these, they are mentioned under 6C (Adjacent projects).

Among the first phase Knowledge for Climate projects, we can mention these projects:

- ▽ Knowledge for Climate-project 'Climate proofing the Netherlands, the institutional context' (2009-2010). This project aims to develop a framework for the assessment of policy instruments which may be used to realize specific adaptation measures. Netherlands Environmental Assessment Agency (PBL), University of Utrecht, Erasmus University Rotterdam, Radboud University Nijmegen, Wageningen University and Research Centre.
- ▽ HSZD01 (Using scientific knowledge by policymakers in the Deltaregion). The results of this project will be used as input for WP4. This is the summary of this project:
Decisions about (infrastructural) investments related to water management and land use are a regular issue within the Southwest Delta region since decades. Prospected changes in the global climate require that the policy makers in this region currently reconsider their water management strategies and land use zoning plans in order to minimize flood risks and optimize freshwater availability. In this proposal we provide a structured approach for the first steps in this regional process: negotiating the uncertainties. The approach will be applied in a pilot study at one of the islands of the Southwest Delta. The pilot study will be selected in consultation with the 'Kennisnetwerk Delta Water' (KNDW). An important selection criterion is that options to optimize freshwater availability are a crucial issue of negotiation between scientists and regional stakeholders in the process of formulating a land use zoning plan. Our first goal is to map the patterns of certainties and uncertainties regarding the freshwater availability for land use both qualitatively, through analysis of cultural concepts, and quantitatively, with statistical analysis. The second goal of this research project is also to translate theory and empirical findings towards practical guidelines for a science policy interface in the Southwest delta, connected to KNDW.