

Cross case analysis of institutions and adaptive capacity in The Netherlands

Do institutions for spatial planning, water and nature management in The Netherlands enhance the capacity of society to adapt to climate change?

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Abstract

In this working document we aim to answer the following question: Do institutions for spatial planning, water and nature management in the Netherlands enhance the capacity of society to adapt to climate change? To answer this question we have first reviewed the literature on adaptive governance and complexity theory. Drawing on this literature, we have developed an assessment tool, the 'adaptive capacity wheel', which distinguishes between three dimensions integral to adaptive capacity: variety, learning capacity, and room for autonomous change, and three factors conducive to adaptive capacity: leadership, resources and fair governance. Subsequently, we have applied this tool to practices of climate adaptation as they are unfolding in the Netherlands now. These case studies are about (1) the changing individual responsibilities in water management, (2) the development of new policies for water safety, (3) practices of climate-proof spatial planning for flood prone areas, and (4) the development of climate adaptation policies for the Wadden Sea.

It follows from the assessment that most practices studied are characterized by a relatively low variety of problem definitions, solutions and institutional arrangements, and that different levels of government and public and private actors are not always involved. For various reasons, the existing variety has not led to large scale implementation of new adaptive solutions so far. Clearly, there is a lack of visionary and entrepreneurial leadership, which is able to connect long term visions to short term action. Moreover, shifting responsibilities between public and private parties causes confusion on who bears responsibility for climate adaptation, hence causes problems of accountability. For most adaptation issues studied, both the variety of policy options and learning capacity is limited to a specific institutional path. Water issues continue to be framed primarily as collective action problems that need to be solved by government action, and in spite of the living with water and flood risk discourses, financial resources are allocated to reducing flood probability by taking structural measures, such as the strengthening of dykes, rather than to reducing flood exposure and flood vulnerability by climate proofing urban areas. A relevant but still unanswered question is how much variety we actually need to be adaptive.

The Adaptation Wheel has proven a useful tool to analyze different dimensions of the adaptive capacity of institutions. The following methodological lessons can be drawn from the application of the adaptation wheel. First, the different scores for the criteria and dimensions should not be presented without the story or argument between the scoring. There may be more than one reason to give a specific criterion a positive or negative score. Secondly, one should take care with aggregation of different scores since a lot of information is lost. Thirdly, the researcher should have an eye for the relationships and possible tensions between the dimensions and criteria.

1 Introduction

Dutch society faces enormous challenges of adaptation to climate change, many of them related to water management. The geographical position of the Netherlands in the delta of the Rhine, Scheldt and Meuse rivers makes the country particularly vulnerable and sensitive to sea level rise, peak discharges of the main rivers, water shortage and salt intrusion. Possible adaptation measures range from the construction of climate proof dikes, the establishment of a national Delta fund, water proofing new urban areas, emphasizing home owners' and citizens' responsibilities for realizing adaptation measures, to the introduction of flood insurance in the Netherlands.

Adaptation to climate change is a highly complex issue which is characterized by both uncertainty and ambiguity (Termeer and Meijerink 2009). There are uncertainties about the magnitude of climate change, the impacts of climate change, such as sea level rise, and about the effectiveness and feasibility of various policy options, such as the creation of room for the river or of climate proof dikes. Climate adaptation issues are ambiguous, because climate change, its impacts and possible adaptation measures are valued, interpreted and framed differently by different parties. Whereas some argue that we should create more room for our rivers, for example by transforming farm lands into wetlands, others argue that we would better protect these farm lands, as climate conditions for food production in the Netherlands will become excellent as compared to expected climate conditions in southern Europe.

Because of the many uncertainties and ambiguities surrounding climate change issues, we cannot directly assess if the practices in the Netherlands are climate proof. We may, however, assess whether there are sufficient possibilities for adaptation to change whatever that change may be. Adaptation to climate change requires a high adaptive capacity (or adaptability) of society (Huiteima et al. 2009). As we do not know beforehand which problem definitions are the right ones and which adaptation measures are most effective, we need to be able to experiment with different options, to learn from experiences gained, and to adjust our policies and strategies to changing circumstances. To assess the adaptive capacity of the Dutch society, we look at the institutions. We define institutions as 'systems of rules, decision-making procedures, and programs that give rise to social practices, assign roles to the participants in these practices, and guide interactions among occupants of the relevant roles' (IDGEC Scientific Planning Committee 1999:14). The rules can be formal, such as laws and regulations, and informal, such as a consensus decision making culture. A both theoretically and practically relevant question is which characteristics of institutions would enhance (or limit) the adaptive capacity of society.

This, of course, is a question, which cannot be answered easily. After an extensive review of the literature on adaptive governance, complexity theory, and the governance literature, we have tried to aggregate the various aspects and characteristics of adaptive capacity mentioned. This exercise resulted in three dimensions integral to adaptive capacity: variety, learning capacity and room for autonomous change, and three conditions which are conducive to adaptive capacity: leadership, resources and fair governance. The questions which need to be answered in an assessment, then, are whether existing institutions allow for or encourage variety, learning capacity, and room for autonomous change, whether they enable the development of certain types of leadership and the provision of necessary resources, and whether they enhance principles of fair governance. To facilitate this assessment, each dimension is operationalized through a number of criteria adding up to a total

number of 22 criteria (Gupta et al., 2010). In Chapter 2, the newly developed assessment tool, the adaptive capacity wheel, is explained.

In Chapter 3 of this paper the case study method is described. We explain how the 'adaptive capacity wheel' is used to assess institutions for spatial planning, water and nature management in the Netherlands through an analysis of practices of climate adaptation as they are unfolding in the Netherlands now. The practices are described in four case studies, which are introduced shortly in Table 3.1 (see Chapter 3).

In Chapter 4 the results of the four case studies are compared. For each dimension a table is produced in which the scores of the different case studies and embedded cases are compared. In an accompanying text we try to explain the results and to reflect on possible tensions between criteria and dimensions.

The case studies and the comparative analysis are parts of a larger project 'IC12 Adaptive capacity of institutions', funded by the national programme Climate Changes Spatial Planning. The adaptive capacity wheel used here was developed in that project. Another part of the project was a content analysis, in which the formal Dutch laws and policy documents were analyzed with the adaptive capacity wheel (see also Figure 1.1). The case studies discussed in this report have to provide more insight in the informal rules and the way people deal with formal rules in practice.

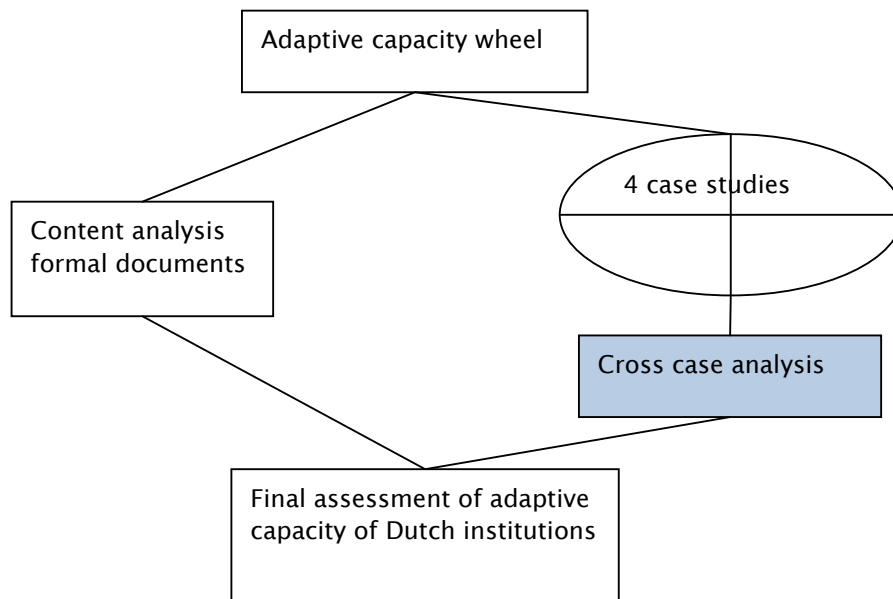


Figure 1.1 Overview of Project IC12 and the position of the cross case analysis

2 The Adaptive Capacity Wheel, an assessment tool

We define adaptive capacity as the inherent characteristics of institutions that empower social actors to respond to short and long-term effects of climate change either through planned measures or through allowing and encouraging creative responses from society both *ex ante* and *ex post*. It encompasses (Gupta et al., 2008, p.11):

- The characteristics of institutions (formal and informal; rules, norms and beliefs) that enable society (individuals, organizations and networks) to cope with climate change, and
- The degree to which such institutions allow and encourage actors to change these institutions to cope with climate change.

This implies that institutions should allow actors to learn from new insights and experiences in order to flexibly and creatively ‘manage’ the expected and the unexpected, while maintaining a degree of identity.

We have aggregated the many different aspects of adaptive capacity into the six (interrelated) dimensions of adaptive capacity already mentioned in the previous chapter. The following sections present a short summary of each dimension. A more elaborate literature review was published elsewhere (Gupta et al, 2008, 2010).

2.1 Qualities integral to adaptive capacity

Three basic qualities integral to adaptive capacity are Variety, Learning capacity and Room for autonomous change.

Variety

Since climate change is characterized by both uncertainty and ambiguity, variety is crucial to the capacity of society to adapt to climate change. We simply do not know enough about climate change, its impacts, and about the effectiveness and feasibility of adaptation measures, to develop an optimal adaptation strategy for the next decades. Literature suggests that a better strategy to deal with complexity and the manifold uncertainties and ambiguities is to encourage variety. According to the ‘law’ of requisite variety, the variety within a system must be at least as great as the environmental variety against which it is attempting to adjust itself (Conant & Ashby 1970). The basic assumption is that “Only variety can beat variety” (Buckley 1968: 495). Institutions should allow for and encourage:

- a variety of discourses, problem definitions and solutions to adaptation issues;
- a variety of actors involved in processes of climate adaptation (multi-level, multi-sector, multi-actor: public and private actors);
- room for diversity;
- redundancy.

Learning capacity

A second dimension integral to adaptive capacity is learning capacity. Adaptation to climate change should be conceived of as a learning process. Ideally, societal actors exchange their problem definitions and solutions and collectively make sense of the issues at stake (social learning) (Pahl-Wostl 2007). Moreover, they should be able and

willing to question their basic assumptions, frames and ideologies (double loop learning) (Argyris and Schön 1978). Institutions should allow for and encourage actors:

- to trust, and mutually respect each other, and to listen to each other;
- to engage in single loop learning through evaluation and monitoring;
- to engage in double loop learning, i.e. to question basic assumptions, frames and ideologies;
- to explicitly consider doubts and uncertainties;
- to stimulate institutional memory through the creation and maintenance of databases and/ or archives.

Room for autonomous change

The third and final dimension integral to adaptive capacity is room for autonomous change: Are actors able to adjust their behavior to new circumstances? Both variety and learning capacity are important but not sufficient conditions to adaptive capacity. Contextual limitations may limit possibilities for translating learning into action. We are interested in the question whether institutions enable social actors to adjust to changing circumstances. In answering this question we distinguish between autonomous and planned changes. Whereas autonomous adjustments refer to the everyday responses to everyday contingencies, breakdowns, exceptions, opportunities and unintended consequences (Orlikowski 1996; Weick and Quinn 1999), planned change is about anticipating the future by planning measures to deal with future threats now. Institutions should allow for and encourage actors:

- to have access to information, e.g. through monitoring of potential impacts;
- to improvise (react on changing circumstances);
- to plan (anticipate changing circumstances).

2.2 Conditions to realizing adaptive capacity

We have distinguished three contextual variables that may enhance the adaptive capacity of society: Leadership, Resources, and Fair governance.

Leadership

Leadership may play a crucial role in realizing Variety, Learning capacity and Room for autonomous change. The leadership literature distinguishes between various types of leadership (e.g. Wallis and Dollery 1997, Andersson and Mol 2002, Goldfinch and 't Hart 2003), Kingdon 1984, Young 1991), which we have grouped into three categories: visionary, entrepreneurial and collaborative leadership (Gupta et al. 2008). Visionary or directional leaders are good at linking time scales and are able to convince others of the need for anticipating potential future threats. Entrepreneurial leaders are good at gaining access to the necessary resources for realizing projects. Finally, collaborative leaders are good at bridging differences of interest, boundary spanning and building coalitions. We need all three types of leadership for successful adaptation to climate change. Therefore, institutions should allow for and encourage:

- visionary leadership;
- entrepreneurial leadership;
- collaborative leadership.

Recourses

A second condition to adaptive capacity is the availability of the necessary resources. These resources include economic resources, human resources, and authority. For adaptation efforts to succeed, society needs to be able to generate sufficient financial resources for developing, experimenting with, and for realizing adaptation strategies. Moreover, climate adaptation requires educated and qualified people (human resources). Finally, authority to take and implement decisions is indispensable to the solution of climate change issues. Institutions should allow for and encourage the generation of:

- economic resources;
- human resources;
- authority needed for taking decisions and implementing policy options.

Fair governance

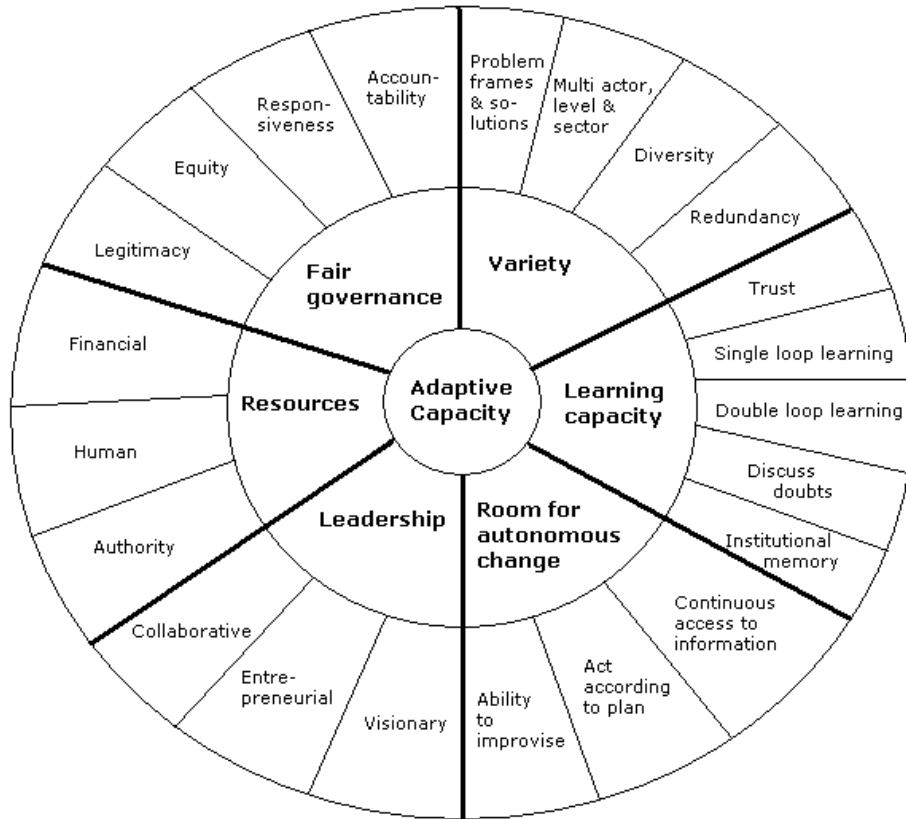
A third and final condition to adaptive capacity is the nature of governance within a society. The nature of governance should allow for and encourage creativity, innovation and the ability to take entrepreneurial risks. Moreover, justice, equity, the rule of law and general social stability are important preconditions for trust and mutual respect, which are necessary for social learning, the criterion which is at the core of adaptive capacity. Institutions should allow for and encourage:

- a legitimate policy process;
- protection of basic rights and equity;
- responsiveness and transparency;
- accountability.

2.3 The Adaptive Capacity Wheel

Building on the previously described six dimensions of adaptive capacity, we have developed an assessment tool: the 'Adaptive Capacity Wheel' (Figure 2.1), which consists of six dimensions and 22 criteria. The scores for each criterion can be positive, slightly positive, neutral, slightly negative or negative. By giving scores between +2 and -2, we are also able to present aggregated scores for each dimension, and an aggregated overall score of adaptive capacity (see the scoring scheme in Figure 2.1).

12 The Adaptive Capacity Wheel, an assessment tool



Effect of institution on adaptive capacity	Score	Aggregated scores for dimensions and adaptive capacity as a whole
Positive effect	2	1,01 to 2,00
Slightly positive effect	1	0,01 to 1,00
Neutral or no effect	0	0
Slightly negative effect	-1	-0,01 to -1,00
Negative effect	-2	-1,01 to -2,00

Figure 2.1 The Adaptive Capacity Wheel and scoring scheme (Gupta et al., 2010)

3 Case study strategy

3.1 Case study design

To investigate whether institutions enhance or limit the adaptive capacity of society, we have applied the Adaptive Capacity Wheel to governance practices for climate adaptation as they are unfolding in the Netherlands now. These case studies are about (1) the changing individual responsibilities in water management, (2) the development of new policies for water safety, (3) practices of climate-proof spatial planning for flood prone areas, and (4) the development of climate adaptation policies for the Wadden Sea. For a concise overview of these case studies see Table 3.1.

The first case study, on the changing individual responsibilities in water management, is an embedded case study (Bergsma, Gupta and Jong 2009). It comprises three sub-cases: one focusing on the adaptive capacity of individual land owners in the city of Delft, one focusing on the adaptive capacity of individual land owners in the city of Zaandam, and one on the adaptive capacity of farmers in De Wijde Wormer. The central question of this case study is whether institutions allow for and encourage the adaptive capacity of these individual actors.

The second case study, on the development of new policies for water safety, is an embedded case study as well (Van den Brink, Termeer and Meijerink 2010a). The analysis focuses on three recent planning practices in the water safety domain: the Room for the River project, the development of the flood risk approach, and the report of the second Delta Committee. The central question of this case study is whether Dutch water safety institutions enhance the capacity of society to adapt to changing flood risks.

The third case study focuses on climate-proof spatial planning in flood prone areas (Van den Brink, Termeer & Meijerink, 2010b). Against the background of the national debate on building – or not building – in the west of the Netherlands, the ‘drain of Europe’, the case study focuses on two geographical levels in particular: climate-proof spatial planning in the Zuidplaspolder at the regional level, and climate-proof spatial planning in Westergouwe at the local level. The central question is to what extent the existing spatial planning institutions enhance the capacity of Dutch society to adapt to the potential impacts of climate change.

The fourth case study investigates practices of adaptation to climate change in the Wadden Sea area (Klostermann 2009). The central question is whether national institutions for nature management allow for or encourage adaptation to climate change.

These four case studies enable us to assess the institutions of three policy sectors which are crucial to climate adaptation: spatial planning, water management and nature management. Moreover, these cases encompass multiple scales and levels of governance, from the scale of one single house to the scale of a river basin or sea, and from the level of the individual to the level of the state. Table 3.1 presents an overview of the four main cases, the various sub-cases and their levels of analysis.

Table 3.1 Case studies on adaptive capacity in The Netherlands

	Case 1	Case 2	Case 3	Case 4
Focus on institutions for:	Urban Water Management	Water Safety	Spatial Planning	Nature Management
Case study area	Delft Zaandam Wijde Wormer	Riverine areas Main Rivers, coast	Zuidplaspolder Westergouwe	Wadden Sea
Level of Analysis	Individual Local	National	Regional Local	National
Sub-cases	Delft Zaandam Wijde Wormer	Room for the River Flood Risk Approach Second Delta Committee	Regional development: Zuidplaspolder Local development: Westergouwe	None

3.2 Research protocol

In each case study we have used the following protocol for applying the adaptive capacity wheel (Gupta et al., 2010).

1. *Preparing for the research.* This step is the selection of a specific case study. The questions to be answered in this step are: which institution or institutional context is the focus of the research, what is the case study area and what is the level of analysis? (See Table 3.1).
2. *Collecting the data.* Next, the researchers collected data for the assessment and scoring of the 22 criteria. Data for the case studies were collected in many different ways. The researchers collected information by analyzing (policy) documents, through semi-structured interviews, participatory observations, and through the organizations of workshops with practitioners. The semi-structured interviews addressed all six dimensions of the Adaptation Wheel. The main challenge in designing the questionnaires was to avoid technical language whilst at the same time collecting the relevant information for the assessment. The interviewees that were selected are people who participate actively in the newly developing adaptation practices. The list of interviewees consists of elected politicians, civil servants, employees of NGOs and industries, and individual land owners. In total, more than 40 people were interviewed and asked to assess the institutional context they are working in. Respondents were selected both on their expertise in climate adaptation and their direct involvement in the case at hand. For more information on the interviewees for the various case studies, see the individual case study reports (Bergsma, Gupta and Jong 2009, Van den Brink, Termeer and Meijerink 2010a, 2010b; Klostermann 2009). The workshops have been particularly useful in validating the data collected in the interviews.
3. *Analyzing the data.* Thirdly, the researcher needed to analyze the collected data and to score the 22 criteria. Since the Adaptive Capacity Wheel is a qualitative tool, and sometimes the data may be interpreted in different ways, it is very important

that the researcher keeps a record of the arguments used for scoring each criterion. This is especially true for case studies, in which the richness of data can confuse the researcher: on which event and on whose views should the score be based? There is always more material to be found and there are new stories to be told which could lead to a change in the scores. In all case studies the criteria were scored by more than one researcher, after which differences in the scores were discussed. Even though this was helpful in validating the scores, the scores always need to be accompanied by an explanation in words. The scoring of the 22 criteria makes it possible to calculate aggregated scores for each dimension and an overall aggregated score for the adaptive capacity of a particular set of institutions. Although the aggregation is helpful in comparing the adaptive capacity of different institutions, a lot of information is lost. As an example, the aggregation of a minus 2 and a plus two leads to a neutral score, for a particular set of institutions, but of course it is much more interesting to know which aspects of the institutions hinder or are conducive to adaptive capacity than to know the overall neutral score.

4. *Interpreting the data.* Fourthly, the scores and arguments need to be interpreted. Such an interpretation should also focus on the tensions or dilemmas between the various criteria, such as between directional leadership and variety. Moreover, the results can also be translated in specific recommendations on how to improve the adaptive capacity of the institutions studied.
5. *Presenting and communicating the data.* The Adaptive Capacity Wheel as such is a powerful communication tool. It is helpful in synthesizing and presenting the often complex findings in a relatively simple picture. In doing so, the researcher runs the risk of oversimplifying complex reality, which is exactly why the wheels should never be communicated without the story behind the different scores and without attention for the inherent tensions between some criteria and dimensions.

In the next Sections, the main research findings across the case studies for each dimension will be summarized.

4 Research findings cross-case comparison

In the following Sections, we present the main research findings across the case analyses. After a cross-case comparison for each dimension, we compare the overall results for each case study. For detailed assessments of the relevant institutions in the separate cases, we refer to the case study reports (Bergsma, Gupta and Jong 2009, Van den Brink, Termeer and Meijerink 2010a, 2010b; Klostermann 2009).

4.1 Variety

Table 4.1 presents the results of the cross-case analysis for the dimension of variety. According to many theories, variety is key to adaptive capacity. It follows from our assessments that practices of climate adaptation as they are unfolding in the Netherlands now display a relatively low level of variety of problem definitions, policy measures, institutional arrangements, levels of government and actors involved. Except for the case study of regional planning in de Zuidplaspolder, where a large variety of policy options have been developed and partly been implemented, the case studies have a slightly positive score at best. The Room for the River case study scores negatively on the dimension of variety.

Traditionally, institutions for water management have hindered the development of a variety of policy options to deal with water management issues. Dutch water policies aimed at reducing flood probability by the building and strengthening of dykes and other flood defence infrastructure primarily. Only recently, institutions seem to allow for and even encourage more variety. First, the range of substantive policy options has broadened. New strategies have been developed to reduce the probability of flooding, such as the room for the river policies and the building of climate proof dykes. Moreover, the new risk discourse has attracted attention to an entirely new set of strategies, which either aim at reducing exposure to or at reducing vulnerability to flooding. These strategies include planning for disasters (e.g. evacuation), and water proofing urban areas. Most of the new policy ideas, however, have not yet been implemented. Institutions for water management and spatial planning seem to allow for and encourage a variety of problem frames, solutions and of institutional arrangements, and this increasing variety may be interpreted as an increase in the adaptive capacity of Dutch society. Looking at the actual implementation of the newly developed adaptation strategies, however, we must conclude that variety is still rather limited. The case studies on planning for water safety and on climate proof spatial planning indicate that the bigger part of the budgets for water safety are used for realizing and maintaining flood protection infrastructure, i.e. for reducing the probability of flooding, and not for climate proofing urban areas. Government prioritizes the classic strategy of reducing flood probability.

In spite of the new responsibilities for home owners and citizens in water management, water safety and water management still are an almost exclusive responsibility of the government, and despite a debate on the potential benefits of introducing possibilities for flood insurance in the Netherlands, Dutch government has not created necessary conditions for the insurance industry to play a role in flood risk management. Finally, the case study on climate proof spatial planning demonstrates that new urban areas continue to be planned in flood prone areas. This is consistent with a series of evaluations of the water assessment, which all show that water managers have hardly succeeded in influencing spatial planning so far.

The only case study with a clear positive score is the regional planning process in the Zuidplaspolder. The parties involved have developed a plethora of strategies that might be used for flood proofing the new urban areas, and have started to implement these strategies as well. Clearly, the regional informal institutions allow for variety.

The Wadden case raises the point when and how variety of problem frames is helpful. Many stakeholders are involved in the Wadden sea debate and a lot of variety exists in problem frames, but respondents give this a negative value. They see the variety as a barrier to agreeing on a solution.

Table 4.1 Cross-case comparison Variety.

Case Studies	Criterion Variety of problem frames and solutions	Criterion Multi-actor, level and sector	Criterion Diversity	Criterion Redundancy	Criterion Variety
1.1 Delft	0	+1	0	0	0,25
1.2 Zaandam	-2	-1	0	0	-0,75
1.3 Wijde Wormer	0	+2	+1	-2	+0,25
2.1 Room for the River	-1	-1	0	-2	-1,0
2.2 Flood risk approach	+2	-1	+2	-2	+0,25
2.3 Second Delta Committee	-1	-1	+1	+1	0,0
3.1 Spatial planning: regional Zuidplaspolder	+1	+1	+2	0	+1,0
3.2 Spatial planning local Westergouwe	-2	+2	+1	-1	0,0
4. Wadden Sea	-1	+2	0	-2	-0,25

4.2 Learning capacity

Table 4.2 summarizes the results of the cross-case analysis for learning capacity. There are remarkably large differences between the scores for the various case studies. The Wadden Sea has a very high score for learning capacity. There are many data on the Wadden sea available and accessible, there is intensive monitoring and a cautiously growing level of trust between the parties. Finally, in the Wadden Sea area there is culture in which fundamental assumptions are being questioned. As a result most parties involved in adaptation practices in the Wadden Sea area have up-to- date information on the seriousness of various problems in this area.

In spite of its relatively high overall score for learning capacity, the Room for the River case has a low score for double loop learning. The reason for this is that the

fundamentals of Dutch flood risk policies were not questioned and discussed. Although the Room for the River policies were very different from traditional policies of building new and improving existing dikes, the policies focused exclusively on a reduction of the probability of flooding, and did not include strategies to reduce flood exposure or flood vulnerability (see also the previous section on Variety).

The scores for the Zuidplaspolder and Westergouwe projects are neither quite negative nor quite positive. When it comes down to location choice, the learning capacity of the spatial planning institutions is limited. They demonstrate a strong path dependent development. Even though many experts had argued that, from the perspective of water safety, Westergouwe is a bad location for developing a new urban area, the development of this new residential area continued. Apparently, the institutions did not offer much room for learning. Because of a decision which had been taken in the past, Westergouwe had to be developed no matter the consequences for water management or safety. As a consequence, learning was confined to the question how to climate-proof the new neighbourhood (without questioning the location). Explorelab, established at Zuid-Holland Provincial Council, played an important role in encouraging these learning processes to take place, both in the Zuidplaspolder and in Westergouwe.

Table 4.2 Cross-case comparison Learning Capacity.

Case Studies	Criterion Trust	Criterion Double loop learning	Criterion Discuss doubts	Criterion Single loop learning	Criterion Institutional memory	Dimension Learning Capacity
1.1 Delft	0	0	0	0	+1	+0,2
1.2 Zaandam	-1	0	-1	+1	-1	-0,4
1.3 Wijde Wormer	+1	0	+2	+1	-2	+0,4
2.1 Room for the River	+2	-2	0	+1	+2	+0,6
2.2 Flood risk approach	+2	-2	-2	+2	-1	-0,2
2.3 Second Delta Committee	+2	-2	0	+2	0	+0,4
3.1 Spatial planning: regional Zuidplaspolder	+2	-1	+2	+1	+2	+1,2
3.2 Spatial planning local Westergouwe	+2	0	+1	+1	+1	+1,0
4. Wadden Sea	+1	+2	+2	+1	-	+1,5

For the case studies on individual responsibilities the overall score for the learning dimension is neutral. Still, there are some interesting differences between the scores on the criteria of trust, ability to discuss doubts and institutional memory. Whereas in the rural case of the Wijde Wormer there is a culture of trust and a culture which allows parties to discuss doubts, in the urban case studies of Delft and Zaandam trust and possibilities to discuss doubts are lacking. This could be explained partly by the informal networks in the Wijde Wormer, where people and organizations all know each other very well, but may also be explained partly by the open and integrated area approach followed in Wijde Wormer.

4.3 Room for autonomous change

Table 4.3 summarizes the scores on the dimension 'Room for autonomous change'. The three case studies on water safety score relatively high on this dimension, mainly as parties do have access to relevant information, such as information on water safety standards, flood risks and policy options, and because parties are able to act according to plan. In spite of these positive scores, the capacity to improvise scores relatively low for two of the three case studies on water safety. Literature suggests that the capacity to improvise decreases if government takes over all responsibilities from society. As was discussed before, Dutch government still plays a crucial role in realizing climate adaptation, and in spite of some policy statements referring to the need for raising water awareness and stressing the responsibilities of societal actors in realizing climate change adaptation, it seems that Dutch government continues to bear responsibility for flood safety in the long run.

The question how this development should be judged from a perspective of adaptive management is a difficult one. Full government responsibility for water safety reduces the room for autonomous change. However, it can also be argued that the Dutch tradition of framing the water safety issue as a collective action problem which needs to be solved by government intervention has been very effective so far, and that there is no reason yet to abandon this policy path.

In all other cases, the room for autonomous change is relatively low, mainly as non governmental actors and civil society do not have access to the relevant information. In all three case studies on individual responsibilities, Delft, Zaandam and Wijde Wormer, information is diffused among different parties, not organized and therefore not easily communicated to individuals. It is only a relatively small group of insiders which has access to the relevant information. It is interesting to see that even though individuals lack access to relevant information, they are satisfied with their capabilities to act, and generally feel there is much space to manoeuvre.

In the Zuidplaspolder plans were developed for crisis management, which, among other things, address evacuation strategies. At the same time, there are many uncertainties about the distribution of responsibilities between national, regional and local levels. In the Westergouwe case possibilities for autonomous adaptation are relatively limited since the decision to build the new neighborhood is taken now. The municipality, however, does have access to the relevant information and tries to prepare the new inhabitants of the neighborhood for disasters.

Finally, in the Wadden sea case study, there are many plans for crisis management, which are being practiced and tested regularly. Moreover, local and regional governments and NGOs do have a lot of knowledge which they can use for autonomous adaptation. At the same time, it should be noted that this information is only available to a relatively small group, and that many inhabitants of the mainland and many

tourists on the islands are lacking such information. Very similar to the results of the three case studies on water safety policies, the case of the Wadden Sea reveals that inhabitants rely on the dikes, and are confident this infrastructure will protect them from flooding.

Table 4.3 Cross-case comparison Room for autonomous change.

Case Studies	Criterion continuous access to information on climate impacts	Criterion Act according to plan	Criterion Capacity to improve	Criterion Autonomous ability to adjust
1.1 Delft	-2	-1	0	-1,0
1.2 Zaandam	-2	-1	+1	-0,67
1.3 Wijde Wormer	0	-1	+2	+0,33
2.1 Room for the River	+1	+2	+2	+1,67
2.2 Flood risk approach	+2	+1	-1	+0,67
2.3 Second Delta Committee	+2	+2	-2	+0,67
3.1 Spatial planning: regional Zuidplaspolder	+2	+1	-1	+0,67
3.2 Spatial planning local Westergouwe	+2	+2	-1	+1,0
4. Wadden Sea	-2	+1	-1	-0,67

4.4 Leadership

Table 4.4 summarizes the scores for the dimension of Leadership. It was suggested in Chapter 2 that we need several leadership styles to be adaptive. First we need visionary leaderships. i.e. leaders who have the skills and capabilities to relate the short term to long term developments. Secondly, there is a need for entrepreneurial leadership, which is a type of leaderships which is able to find resources and secure realization of adaptation measures. Finally, we need collaborative leadership, which is aimed at connecting and bridging between different policy sectors, levels of government, and between government, civil society and the private sector.

The case studies of Delft, Room for the River, the Second Delta Committee and Westergouwe have a positive score; in these cases there is a relatively good balance between various leadership styles. In Westergouwe, the division of leadership between

the government authorities involved was even emphasised by the interviewees as one of the most important strengths of the planning process.

There is a lack of rules regarding how to incorporate climate change in the practice of spatial planning. The initiative to do this is with the provincial governments. In the Zuidplaspolder, Zuid-Holland Provincial Executive is clearly a leader. In Westergouwe, there is strong leadership of Gouda Municipal Executive. However, whereas the institutions promote visionary leadership in both cases (in particular by Explorelab of Zuid-Holland Provincial Council), the Zuidplaspolder lacks entrepreneurial and collaborative leadership. These types of leadership only seem to develop in case of a strong sense of urgency, as in the case of Westergouwe.

Traditionally, the water sector is relatively strong in visionary and entrepreneurial leadership. Most plans and projects which have been developed, such as the Delta plan and Delta project and the new space for river policies clearly use a long term perspective. Moreover, the engineering culture of the sector has a strong problem solving orientation. Collaborative leadership, however, is of a more recent date. Because the space for water and risk discourses have gained importance now, collaborative leadership is more important than ever. Water managers need to cooperate with spatial planners, land owners and so on to be able to realize their new policies.

The case study on climate adaptation in the Wadden Sea underscores the need for leadership to realize adaptation to climate change. It is shown that there is a huge variety of actors involved, each having different frames of the adaptation issues at stake, and different preferences about adaptation strategies. Because of a lack of collaborative and visionary leadership, however, the parties involved all are rather negative about the progress that has been made in the Wadden Sea so far. They all tend to complain about the complexity, which is caused by the levels of government and number of actors involved, and a lack of leadership. Exactly because of the fragmentation of resources, parties are highly dependent on each other for realizing their objectives, and are hardly able to experiment with new policy strategies on their own. The lack of local autonomy in combination with a lack of leadership may explain why the variety of policy ideas and strategies generated has not been very productive so far.

Table 4.4 Cross-case comparison Leadership

Case Studies	Criterion Visionary Leadership	Criterion Entrepreneurial leadership	Criterion Collaborative leadership	Dimension Leadership
1.1 Delft	+1	+2	0	+1,0
1.2 Zaandam	0	+2	-1	+0,33
1.3 Wijde Wormer	+1	-2	+2	+0,33
2.1 Room for the River	+1	+2	+1	+1,33
2.2 Flood risk approach	+1	-1	-2	-0,67
2.3 Second Delta Committee	+1	+2	+1	+1,33
3.1 Spatial planning: regional Zuidplaspolder	+2	-2	-1	-0,33
3.2 Spatial planning local Westergouwe	+1	+2	+2	+1,67
4. Wadden Sea	-2	-1	+1	-0,67

4.5 Resources

The capacity of society to adapt to climate change is largely dependent on the availability of the necessary resources, such as financial resources. Table 4.5 summarizes the results of the cross-case analysis for the dimension of Resources. The case studies of Room for the River, and the second Delta committee have a positive score. The case studies of regional and local spatial planning and the Wadden Sea have a negative score. The Zuidplaspolder has some financial resources because this is seen as an exemplary project with international status. However, when it comes down to implementing paper plans, there is much more uncertainty about the availability of resources. This also goes for the Westergouwe project. The case studies on individual responsibility in the three municipalities show a negative score for the rural area (Wijde Wormer) and a positive score for more urbanized areas (Delft and Zaandam).

A comparison of the various case studies and policy sectors reveals that the water sector possesses some unique institutional arrangements to generate the necessary resources for realizing water safety. On the regional level, the Dutch water boards have

competencies to raise specific taxes for water management purposes. This specific competency enables the water boards to always generate sufficient financial resources for maintenance of dykes and other water management infrastructures. On the national level, such institutional arrangements are lacking, and there always is a danger that the budget which is needed for maintaining water safety in the Netherlands is allocated to other purposes, such as public health or education, since these sectors tend to be more appealing to both the electorate and politicians. It is exactly for that reason that the second Delta commission (Commission Veerman) has recommended the establishment of a so called Delta fund. Although Dutch government has recently approved a proposal for such a fund, which guarantees that 1 billion euro will be made available yearly as from 2020, it remains to be seen how this idea will be implemented in practice. The latest plans are to make the Delta fund a specific part of the existing investment fund for infrastructure, and it is not clear yet whether this fund will generate *additional* resources for climate adaptation. Unlike water managers, spatial planners and nature managers have few possibilities to generate the necessary resources. In projects such as the spatial core decision on Space for the river other policy sectors are highly dependent on Rijkswaterstaat for realizing their objectives.

Table 4.5 Cross-case comparison Resources

Case Studies	Criterion Authority	Criterion Human Resources	Criterion Financial resources	Dimension Resources
1.1 Delft	+1	+2	-1	0,67
1.2 Zaandam	+1	+1	0	0,67
1.3 Wijde Wormer	-2	+1	-2	-1,0
2.1 Room for the River	+2	+2	0	+1,33
2.2 Flood risk approach	-1	-1	-1	-1,0
2.3 Second Delta Committee	-1	+2	+2	+1,0
3.1 Spatial planning: regional Zuidplaspolder	0	+1	-2	-0,33
3.2 Spatial planning local Westergouwe	+1	+2	-2	+0,33
4. Wadden Sea	-2	-1	0	-1,0

There is a lack of financial resources for adaptation in the case studies on possibilities for individual adaptation (Zaandam, Delft and Wijde Wormer). Existing arrangements, such as the *Investeringsbudget Landelijk Gebied* (ILG) or the financial arrangements to

compensate farmers for water storage capacity on their land, are not sufficient for realizing the necessary adaptation measures. Still, the cases of Zaandam and Delft have a rather positive score on the dimension of resources. This is explained by the availability of sufficient human resources and the authority of key-actors involved. In the case of Wijde Wormer neither of the actors involved has sufficient authority to realize adaptation measures.

The case study on climate adaptation in the Wadden Sea area also demonstrates that few financial resources are allocated to nature development. Rijkswaterstaat used to take the responsibility for nature management in the Wadden Sea but has begun to focus on its core business. The Ministry responsible for Nature Management does not have sufficient budget for nature management in the Wadden Sea area. The Wadden fund (*Waddenfonds*), Delta fund and WILG are helpful to some extent. On the availability of human resources, many respondents refer to a lack of enforcement of existing nature policies and regulations.

4.6 Fair Governance

Table 4.6 summarizes the results of the cross-case analysis for the dimension of fair governance. Fair governance is the only dimension where all case studies score neutral or positive. The criteria for fair governance hardly discriminate between the various case studies. In general, respondents were of the opinion that governance processes are fair. The only exception is the issue of accountability. The case studies on individual responsibility (Delft, Zaandam and Wijde Wormer) and the case study on the Wadden Sea have negative scores for accountability. There are two main reasons why accountability is an issue in the case studies on individual responsibility. The first one is that there are many different organizations involved in ground water management, and that individual households often do not know which organization is responsible, and can be held accountable. The second reason is that government increasingly expects households to take their own responsibility, and it is unclear who is responsible for what.

In the Wadden Sea case, some of the respondents of NGOs argued that there may be enough equity for humans, but not for other life forms. As a consequence of this view, they left the negotiating tables behind and went to court, where they won their case. By the remaining parties, leaving the negotiating table was seen as unfair. This shows how views on fair governance can also differ. Possibly, the adaptive capacity wheel can surface such differences in views which in turn may help the debate on adaptation in the Wadden Sea.

The other criteria of fair governance possibly are more discriminating in international comparative case studies, but they might also be less relevant for adaptive capacity than we assumed. Recent work by Huitema and Meijerink (2009) on the role of policy entrepreneurs in 15 countries around the globe has revealed that policy change and adaptation (including implementation) is possible in any institutional context, including ones that do not meet the criteria of fair governance. These criteria, therefore, might be more relevant from a normative point of view than from a perspective of adaptability.

Table 4.6 Cross-case comparison Fair Governance.

Case Studies	Criterion Legitimacy	Criterion Equity	Criterion Responsiveness	Criterion Accountability	Dimension Fair Governance
1.1 Delft	0	+1	0	-2	-0,25
1.2 Zaandam	+2	0	0	-2	0,0
1.3 Wijde Wormer	+2	0	+2	0	+1,0
2.1 Room for the River	+2	+2	+1	+2	+1,75
2.2 Flood risk approach	+2	-1	-1	0	0,0
2.3 Second Delta Committee	+2	+2	+2	+2	+2,0
3.1 Spatial planning: regional Zuidplaspolder	+2	+2	+1	+2	+1,75
3.2 Spatial planning local Westergouwe	+2	-1	+2	+2	+1,25
4. Wadden Sea	0	-1	+2	-2	-0,25

5 Conclusions

Table 5.1 presents the overall results of the cross-case comparison. It can be learned from the assessment that the adaptive capacity of the water sector (case studies of Room for the River, Second Delta Committee and flood risk approach) and the spatial planning sector (case studies of Zuidplaspolder, Westergouwe) is relatively high, although the flood risk approach has not yet been implemented and the construction of for example Westergouwe is threatened by the potential lack of financial resources. The adaptive capacity in the Wadden Sea case (sector of nature management) is negative for all dimensions except for the dimension of learning capacity. In this case study, there clearly is a lack of leadership and of financial resources. The overall-scores for the case studies on individual responsibilities are neutral (they score either slightly negative or positive).

Apart from the results of the assessment of the various criteria and dimensions, the case studies have also produced information on some tensions or dilemmas between the criteria and dimensions.

From a perspective of adaptive management variety should be encouraged. As it is not known beforehand which strategies will turn out most effective, it is wise to implement and test various strategies at the same time. Some strategies, however, may be incompatible, i.e. the use of one policy strategy may negatively affect the effectiveness of another. As an example, water safety is increasingly framed as an issue for which civil society and the private sector need to bear responsibility. Dutch government aims to raise water awareness in Dutch society, and would like citizens and other societal actors to take responsibility. Government tries to stimulate forms of self-organization in finding and implementing adaptation measures. The very same government, however, would like to increase safety standards by a factor 10, thus limiting flood probabilities considerably. It seeks public and political support for realizing large scale infrastructure projects, such as the construction of 'unbreakable' delta dikes, or a range of technical measures needed to raise the water level in the freshwater lake IJsselmeer. This, of course, would decrease water awareness even further. After all, why should citizens bother about water safety if government takes care? Clearly, the adaptation issue is framed ambiguously. On the one hand it is framed as an issue for which societal actors should bear responsibility themselves, on the other hand it is framed as a classical collective action problem that needs to be solved by government. The interesting thing, of course, is that there may be a tension between the two. A government which demands support for the realization of large scale infrastructure projects suggests it has accepted full responsibility for the water safety issue. Sometimes this governmental responsibility is flagged for strategic reasons, for example, by presenting the Netherlands as the 'safest delta in the world'¹. This is done both to attract foreign investments in an area below sea level, and to sell Dutch water technology all over the world.

The case studies on individual responsibility in urban water management have revealed a related tension. It is shown that government tries to make citizens and home owners responsible for certain aspects of water management, such as drainage of rainwater, but that the parties involved do not have the same perception of the distribution of responsibilities between the local authorities and land owners. This case

¹ See for example: (in Dutch)
[http://www.rijkswaterstaat.nl/images/Mooiste%20en%20Veiligste%20Delta%20\(folder\)_tcm174-279903.pdf](http://www.rijkswaterstaat.nl/images/Mooiste%20en%20Veiligste%20Delta%20(folder)_tcm174-279903.pdf)

study shows that, after intensive rainfall and urban flooding, this may easily lead to a situation in which government argues that land owners and citizens should have taken their responsibilities, whereas the latter held the former accountable. If an increasing variety of institutional arrangements is not accompanied by a clear division of responsibilities, this may easily lead to a situation in which no one feels responsible or accountable.

It turned out that the dimension of variety is strongly related to the dimensions of learning capacity and room for autonomous change. Because the variety of policy strategies was often restricted to a particular institutional path (for example, the decision to build in low-lying polders), learning was restricted to that particular policy path as well (deciding how to build in Westergouwe, but not in what other location houses could be built instead). And as the case studies have also shown that government still is the dominant actor in adaptation to climate change (there is a limited variety of actors involved), we might argue that the room for autonomous change for societal actors still is relatively low.

Table 5.1 Cross-case comparison Adaptive CapacityTable

Case Studies	Variety	Learning	Room for autonomous change	Resources	Fair governance	Leadership	Total
1.1 Delft	+0,25	+0,2	-1,0	+0,67	-0,25	+1,0	+0,14
1.2 Zaandam	-0,75	-0,4	-0,67	+0,67	0,0	+0,33	-0,14
1.3 Wijde Wormer	+0,25	+0,4	+0,33	-1,0	+1,0	+0,33	+0,22
2.1 Room for the River	-1,0	+0,6	+1,67	+1,33	+1,75	+1,33	+0,95
2.2 Flood risk approach	+ 0,25	-0,2	+0,67	-1,0	0,0	-0,67	-0,16
2.3 Second Delta Committee	0,0	+0,4	+0,67	+1,0	+2,0	+1,33	+0,90
3.1 Spatial planning: regional Zuidplaspolder	+1	+1,20	+0,67	-0,33	+1,75	-0,33	+0,66
3.2 Spatial planning local Westergouwe	0	+1,00	+1,00	+0,33	+1,25	+1,67	+0,88
4. Wadden Sea	-0,25	+1,5	-0,67	-1,0	-0,25	-0,67	-0,22

Both leadership and resources are crucial conditions to adaptive capacity. Whereas the Dutch water sector possesses relatively successful institutional mechanisms for generating the necessary resources, such as the water board taxes, in the policy sectors of spatial planning and nature management such mechanisms are lacking. The case studies indicate that the spatial planners and nature managers often depend on the water sector for realizing their objectives. For example, in the water safety case,

the funds generated for large scale revision of water infrastructure creates opportunities for local actors to improve the landscape and to realize recreational facilities.

Furthermore, we have seen that variety can only lead to actual implementation of solutions once it is accompanied by strong collaborative and visionary leadership, that institutional variety may easily lead to issues of accountability, and that some policy strategies may be incompatible. In sum, there are good reasons for cherishing variety, but the implementation of this concept in practice surely is not unproblematic.

6 Reflection

In this working document we have presented a tool to assess institutions for adaptation to climate change, and applied this tool to some practices of climate adaptation as they are unfolding in the Netherlands now. During the case studies, we have learned that the various dimensions and criteria of the adaptive capacity wheel are a useful means to discuss the strengths and weaknesses of particular institutions, but that it is sometimes difficult to present 'hard' scores for each criterion separately. We have learned that just presenting the scores on the various dimensions would not make much sense, as the main results of the assessment can only be understood in combination with the 'story' behind the assessment. Moreover, information is lost when the scores for the criteria are aggregated for a score on a dimension, and when the scores for the dimensions are aggregated for an overall score. That is why aggregated results should always be interpreted with care.

The assessment inevitably involves interpretations by both the interviewees and the case study researchers. Exactly because of the different interpretations of adaptation practices and because of the inherent tension between some of the dimensions and criteria, it is rather difficult if not impossible to formulate 'objective' final conclusions and recommendations about the adaptive capacity of institutions. The assessment tool, however, has proven useful to disentangle key- dimensions of adaptive capacity as well as their inherent tensions.

The finding that the actual implementation of adaptation strategies and learning are often restricted to a particular institutional path, raises a both theoretically and practically relevant question: how much variety do we actually need to be adaptive, or in other words: what exactly is the 'requisite variety' in a particular case. Complexity theory and literature on adaptive governance for good reasons point to the need for cherishing variety. The concept of 'requisite variety', however, suggests that there is some optimum of this variety. A crucial yet unanswered question then is where this optimum is. As an example: How can we know whether an increase in the variety of policy options to reduce flood probability is sufficient or whether we really need to change our practices of spatial planning, and should no longer build in low-lying areas?

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