Institutions For Climate Change

Case study on individual responsibility

Working Document 7

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Abstract

A key element of the adaptation to climate change strategy of the Netherlands Government is changing the roles and responsibilities of different social actors. One aspect is emphasising the role of individuals and their own responsibility in dealing with climate change impacts. This case study examines how this concept is being translated, interpreted and experienced at local level in Zaanstad and Delft. Based on interviews and policy documents, this case study also examines the more long-term issue of whether institutions stimulate the adaptive capacity of social actors by testing an adaptive capacity framework. In the last chapters, conclusions and recommendations are formulated on both matters.

Key words: climate change, governance, institutions, adaptive capacity, criteria

1. Introduction

1.1 The purpose of this report

A key element of the adaptation to climate change strategy of the Netherlands Government is changing the roles and responsibilities of different social actors. One aspect is emphasising the role of individuals and their own responsibility in dealing with climate change impacts. This case study examines how this concept is being translated, interpreted and experienced at local level in Zaanstad and Delft.

1.2 The Shift to Individual Responsibility

In several recent policy documents that concern adaptation to the impacts of climate change, the responsibility of individuals and private parties (civilians, companies, farmers, project developers, etc.) is stressed. The most important policy note of the current Dutch government (Samen Werken, Samen Leven: Work Together, Live Together) for example depicts the public sector as one that is subservient to civilians: they should provide civilians with space to search for and implement their own solutions to problems. But also in the National Safety Strategy, the subsequent National Risk Assessment Report and the Agenda for the Future the responsibilities of individuals are emphasised. In the first mentioned strategy, it is stated that "the supervision of strengthening national security lies in the hands of the national government. However, providing safe living conditions in the Netherlands requires the efforts of everyone in society: not only the government plays a role here, also the efforts of Dutch' companies and societal organizations are needed (Ministerie van BZK 2007, p.2[1]). In the first National Risk Assessment Report, in which four major threats – one of them being climate change – to The Netherlands are analyzed for their possible impacts and for the role different parties can play in tackling those threats, increasing the capacity of civilians to cope with the impacts themselves is emphasised as an important strategy (Ministerie van BZK 2008[2]). In the Environmental Agenda for the Future, an environmental policy plan issued in 2006, climate change is posed as a problem that will change the relationship between government, industries and civilians (Ministerie van VROM 2006[3]).

Central questions in this study are 'how is this individual responsibility dealt with in practice?' and 'What strategies are used to increase the individual responsibility and how are these received in society?' We will try to answer those questions by conducting two case studies in which we look at the official institutional context and the experienced with this in practice. We have chosen to focus on local water management. Different par-

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1 Ministerie van BZK (2007) Strategie Nationale Veiligheid. Online available at: http://www.regionaalcrisisplan.nl/bestanden/file32028243.pdf [21 December 2008].

2 Ministerie van BZK (2008) Programma Nationale Veiligheid – Nationale Risico Beoordeling Bevindingenrapportage. Online available at: http://static.ikregeer.nl/pdf/BLG16027.pdf [22 December 2008].

3 Ministerie van VROM (2006) Toekomstagenda Milieu. Online available at: http://www.vrom.nl/docs/publicaties/6139.pdf [22 December 2008].

ties are already involved in local water management in The Netherlands and recent legislation in this area treats the subject of responsibilities of different parties for local water management. We are curious how responsibilities for local water management are divided in practice, whether recent developments like a growing awareness of climate change and new policy and legislation has changed this division, and how this whole institutional setting is experienced by actors at the local level. We will hereby specifically focus on the role of the individual.

Hence, the case studies aim to answer the following question:

How is individual responsibility in relation to adaptation to climate change in local water management being articulated and experienced by social actors at local level?

- ***Are social actors aware of the changes in responsibility as a result of the paradigm shift towards individual responsibility in the adaptation issue in particular and in politics in general?***
- ***How is this perceived? Is the shift in responsibilities clear and logical and will it in general enhance adaptive approaches?***
- ***What are the advantages and disadvantages of such an approach?***

1.3 Testing the Adaptive Capacity Framework

Working Document w-08/21 outlined an adaptive capacity framework. Adaptive capacity is interpreted as the inherent characteristics of institutions that empower social actors to respond to short and long-term measures either through planned measures or through allowing and encouraging creative responses from society both ex ante and ex post. To assess the adaptive capacity of institutions, we have developed an adaptive capacity framework. We have identified six dimensions of adaptive capacity in this framework. Variety, Learning capacity and the Ability to adjust to change can be seen as integral to adaptive capacity. Leadership, Resources, and Fair governance are considered to be contextual variables that contribute to adaptive capacity indirectly.

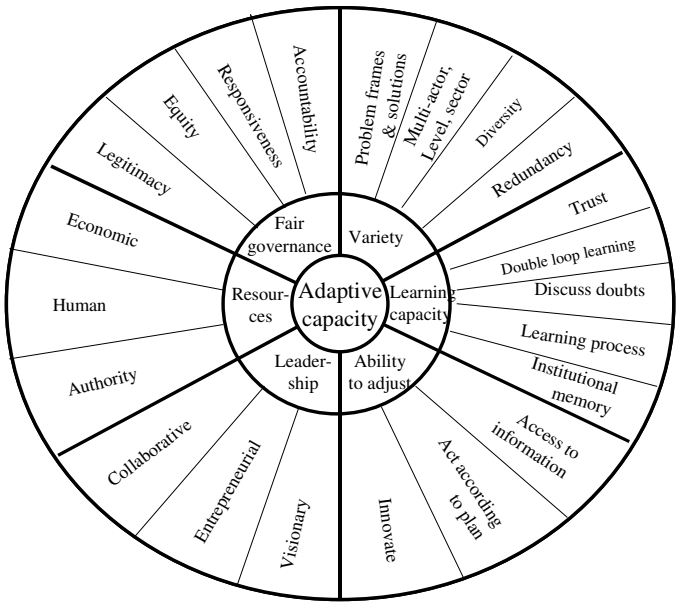

Figure 1.1 Score Card for Adaptive Capacity

This framework resulted in the creation of the Adaptive Capacity Score Card (see figure 1.1). Using colours to distinguish between high (green), neutral/medium (blue), and poor (red) adaptive capacity, this card may be used as a simple communication means. The purpose of the Score Card is to both assess and inform social actors about how their institutions score on adaptive capacity and where there may be room for reform.

In this study, shaping individual responsibilities is considered an institution. Another question therefore is what conclusions can be drawn about the adaptive capacity of this institution: does the current institutional context around individual responsibility enhance adaptive capacity?

Hence, this case study also intends to address the following question:

How do social actors feel about the ability of institutions to promote their own adaptive capacity and their ability to redesign the social institutions?

- ***Do the institutions allow for all kinds of problem framing and solutions, engage all relevant actors and promote diversity of solutions?***
- ***Do the institutions allow social actors to trust each other, discuss doubts, learn from experience and maintain memory of past events?***
- ***Do the institutions allow social actors access to information, the ability to act according to plan and room to innovate if necessary?***
- ***Do the institutions support the rise of leaders who are visionary, entrepreneurial or promote collaborative work?***
- ***Do the institutions generate the necessary mandate and economic and human resources?***
- ***Do the institutions allow for legitimate policy processes that support equity, respond in time and are accountable?***

Apart from practical results, we also hope the case study results will provide us with useful information on the feasibility of the Score Card for Adaptive Capacity to be used in case study research and the value of the score card to assess the adaptive capacity in practice. We therefore hope to address the following questions as well:

Do actors feel that making judgements about the above criteria is easy or not and why?

Do actors feel that the above criteria capture the necessary ingredients that reflect the adaptive capacity of institutions?

1.4 Outline of this report

The next chapter will shortly outline the institutional context of the Netherlands concerning local water management. The third chapter provides a justification of the choice of two case study localities and the method applied. In chapter 4 and 5 the results of the case studies will be depicted. And last, in chapter 6 a comparative assessment will be made on the basis of which conclusions will be drawn.

2. Institutional context around local water management in The Netherlands

Until the first of January 2008, the official division in responsibilities for local water management in the Netherlands can be specified as follows.

Private parties: According to Dutch civil law, the owner of a parcel has the official responsibility to safeguard his or her property from water problems. This means the owners should provide sufficient drainage of water that enters his or her parcel as a result of rain, groundwater flows and households' wastewater. This water should ultimately be transported to surface waters like ditches, canals or lakes. Furthermore, the owner should comply with norms imposed with regard to the water permeability of buildings, as laid down in '*het Bouwbwsluit*'[4]. Owners can be residents, but also for example housing associations, businesses, project developers and governments.

Water boards: Local water boards are responsible for the management of surface waters and the management of water levels. In the Netherlands, the water level is fixed for every singly square meter. This level is determined by the water boards and approved by provinces. It is based on the dominant activity in the area: agricultural lands for example are guaranteed a higher water level then built areas. Local water boards can install norms on the quality of drained water[5].

Municipalities: Municipalities also are attributed with a responsibility in local water management. They are responsible for managing the public sewer through which the wastewater is transported from the parcel to the surface water[6]. Moreover, municipalities are responsible for establishing municipal spatial plans, in which the function of an area is determined and form the basis for building permits. In 2003, an adjustment of the '*Besluit op de ruimtelijke ordening'* introduced a duty to municipalities to take the outcomes of water test performed by local water boards to show the implications of new spatial plans on the local water system into

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4 For information on this legislation, see the dossier on building legislation on the website of the Ministry of VROM: http://www.vrom.nl/pagina.html?id=18258&ref=http://www.google.nl/search?hl=nl&q=het+bouwbesluit&meta= [28 December 2008].

5 This mandate is laid down in the '*Wet op de Waterhuishouding*', of which the text is available online at: http://www.st-ab.nl/wetten/0708_Wet_op_de_waterhuishouding_Wwh.htm [28 December 2008].

6 This duty is specified in the '*Wet Milieubeheer'*, of which the text is available online at: http://www.st-ab.nl/wetten/0613_Wet_milieubeheer_Wm.htm [28 December 2008].

account. Additionally, the '*Nationaal Bestuursakkoord Water (NBW)*'[7] arranges that spatial developments in one place may not have detrimental effects on the water system in another place, and that detrimental effects should be compensation for within the planning area.

Province: Last provinces play a role in local water management, although a minor one. They should include a water section in provincial spatial plans (*provinciale structuurplannen*), supervise and approve municipal spatial and sewer plans, and issue permits for groundwater withdrawals at large scale.

This division in responsibilities has been proved to be problematic in several instances. Responsibilities are not always clear to all parties, different (partial) responsibilities are diffused among different parties, and different parties are dependent on each other to live up to their responsibilities. That this especially is a problem in groundwater management, is amongst others explicated by Urlings & Van de Winckel (2006[8]) in their study 'Living with Groundwater'.

In practice, when a problem arises, it was (and still is for that matter) often not known what or who is at the cause. Consider the example of damage to basement walls resulting from moist. This could have been caused by bad drainage at the parcel, insufficient drainage capacity of the public sewer system, nearby construction activities that have increased the total amount of paved surface hereby reducing the natural drainage capacity, extreme rainfall or a combination of those. Also, the responsibility of municipalities remained surrounded by haziness. Officially, they were only responsible for sewer water drainage, but because of mixed sewer systems in which both waste- and rainwater are transported, this separation was not always clear. Recent national policy stimulates the construction of a seperated sewer system in which rainwater is disconnected from the wastewater system.

In 2004, the Commission on Integral Water management (CIW) advised the Dutch government on the difficult issue of groundwater management (CIW 2004[9]): "Taking the shift to a climate characterized by more extremes and the increasing urbanization in our country into account, the call for clear agreement has grown" (p.3). The commission formulates recommendations to different groups: civilians, water boards, drinking water companies, the construction industry and spatial planners. Common starting point in all recommendations is the premise that "everybody is responsible on its own territory"(p. 7). The commission concludes that lay people often pitch their expectation too high with regard to the possibilities at hand to guarantee the fixed water levels, are inadequately

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7 Text of the NBW is online available at: www.helpdeskwater.nl/aspx/download.aspx?File=/publish/pages/473/nationaal_bestuursakkoord_water.pdf [28 December 2008].

8 Urlings, M.G. & L.C.E. van de Winckel (2006) Boven Water Komen, Definitiestudie grondwateroverlast bestaand stedelijk gebied. Tauw: Capelle a/d IJssel. Online available at: http://www.denhaag.nl/Docs/dsb/riow/Tauwrapport%20Boven%20Water%20Komen.pdf [23 December 2008].

9 CIW (2004) Samen leven met grondwater - Visie op het voorkomen en oplossen van stedelijke grondwaterproblemen. Online available at: http://www.helpdeskwater.nl/ciw/bibliotheek_1/?ActItmIdt=1002 [28 December 2008].

aware of their own responsibilities, are not sufficiently informed about problems relating to groundwater when buying or renting a residence or industrial building and that they have no place to go with questions or complaints. The most important recommendation is addressed to municipalities however: legally specify a municipal 'duty of care' for groundwater. In their proposal, the parcel owners maintain their responsibility of providing sufficient groundwater drainage on its own parcel, but the municipality should make sure that "civilians can live up to this responsibility"(p. 9). Around the same time the advise of CIW was published, problems with regard to responsibilities around rain water received increasingly more attention.

The above-described developments lead to some new developments in local water management. Most importantly, the instalment of a new legislation in January 2008: the 'Wet Gemeentelijke Watertaken (WGW[10]). This law does not really introduce a new division of responsibilities, but is intended to strengthen the current one. Some elements of this law are noteworthy. First, the responsibility of individuals (parcel owners) to make sure their parcel is sufficiently drained is repeatedly stressed. Furthermore, the law places a 'duty of care' on the shoulders of municipalities for groundwater, wastewater and rainwater[11]. The law obligates municipalities to consider the possibilities for the individual to live up to their responsibility. If it has to be concluded that the circumstances do reasonably not allow the individual to execute his or her responsibility, the municipal government should step in and take over the individual responsibility. In practice this means that the municipality should make sure that the individual is provided with sufficient facilities to drain their water into. If the municipality is not able to ensure those facilities, the drainage responsibility shifts to the municipal government. This consideration of the municipality should be based on a costs and benefits analysis and be implemented in the obligatory municipal sewer plans (*gemeentelijke rioolplannen*). Municipalities are since the introduction of the WGW allowed to recover the additional costs through sewer taxes. Last, the WGW obliges municipalities to serve as an 'information bureau' (*loketfunctie*) for its residents: municipalities ought to be the place where residents can go with questions and complaints about local water management.

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[10] Text of the law is online available at: http://www.infomil.nl/aspx/get.aspx?xdl=/views/infomil/xdl/page&ItmIdt=177760&SitIdt=111&VarIdt=82 [23 December 2008].

[11] The association of Dutch Municipalities (Vereniging Nederlandse Gemeenten: VNG) has published an information brochure for municipalities on the consequences of the new WGW and especially the duty of care for their policies. See: VNG (2007) Van Rioleringszaak naar Gemeentelijke Watertaak. Online available at: http://www.helpdeskwater.nl/actueel/?ActItmIdt=6528 [23 December 2008].

3. Methodology

3.1 Introduction

This chapter will go into the used methodology in selecting and performing the case studies.

3.2 Choice of case study regions

A focus on individual responsibility calls on discussing this at local level and hence the choice of two local regions. We decided to choose regions that suffered from water problems and that had some kind of policy to counteract those problems. We selected one region in which the problems mainly occur within the build environment (Delft), and one region in which the problems also stretch out to the agricultural and natural areas (region Zaanstreek with a focus on Zaanstad and Wormerland). We applied this distinction to find out if there is a different approach to individual responsibility, or a different approach needed.

Table 3.1. Choice of case study regions

Criteria	**Delft**	**Zaanstad & Wormerland**
Water problems	Problems with groundwater, sewer and area water in an old city centre	Problems with groundwater drainage in the build environment and problems with finding suitable locations for water retention in natural and agricultural areas
Focus on	Inner city	Outer areas
Existence of water plan	Since 2000	Since 2005
Other	Delft has dealt with water problems for many years now	Zaanstad is busy with PR to citizens

3.3 Actor selection

To start with, we did a short literature survey on the two regions to get a sense of the most urgent water problems and the actors involved. On the basis of this survey, we have invited relevant actors to participate in the case study research by means of an interview. We used an actor typology of three categories: governmental parties (e.g. water boards, municipalities), individual parties (e.g. residents, farmers and businesses) and third parties (e.g. NGO's and scientists). The aim was to have an equal representation of interviewees in all categories. Most selected actors were directly associated with the region

under consideration, but some actors had a broader scope. We made use of this broader scope to be able to place the case study research in a national context. Furthermore, we chose to select actors who have been active in the field of water management or are to some extent familiar with climate change related issues; so that they would be likely to have a clear position on many of these issues. In table 2.2 a list of interviewed actors is submitted.

Table 3.2. Types and numbers of stakeholders interviewed

	Government (municipality; waterboard; provinces)	**Individuals (farmers; households; housing corporations, businesses)**	**Third parties (NGO's and scientists)**
Zaanstad	Gemeentelijk Adviesbureau Funderingsherstel Gemeente Zaanstad Hoogheemraadschap Hollands Noorderkwartier Gemeente Wormerland Dienst Landelijk Gebied Provincie Noord-Holland	Willemars Makelaars Bewonersplatform Krimp LTO-Noord	Stivas Noord Holland Landschap Laag Holland
Delft	Gemeente Delft Provincie Zuid Holland Bestuur Hoogheemraadschap Delfland	Bewonersplatform Binnenstad Noord Woningbouwcorporatie Vestia Eigenaren Nieuwelaan	Syncera Stichting Platform Fundering Nederland

2.4 Interviews

The interviews consisted of a list of eleven questions. The first three questions were aimed at representing the view of the interviewed on the current division of responsibilities between parties. The subsequent seven questions addressed the criteria of the Score Card on Adaptive Capacity. And in he closing question we asked their opinion on the relevance and feasibility of those criteria.

At the start of the interviews, our aim was to explain the score card to the people we interviewed, to get their straight opinion on the method. During the first interviews, this proved to take up a lot of time, to explain the criteria themselves and because it lead to confusion on the aim of our research. Therefore, after the first three interviews, we decided to leave the explanation of the score card undone but still ask the questions related to the criteria so we could still assess the applicability of the score card in local case study research. But the first lesson is already learned: the method is not really useful to directly confront local actors with.

4. Case Study 1: Zaanstad

4.1 Introduction

In this chapter and the next, we will depict the results of the case studies. First we will give a description of the main characteristics of the regions under study and their most pressing water problems. After that we will go into the perceptions on the division of responsibilities between parties concerning water problems among the interviewed. Here, we will specifically pay attention to the experiences with the individual responsibility. Then we will turn to the Score Card on Adaptive Capacity: can we score the different dimensions of adaptive capacity on the topic of individual responsibility? In the last part, we will see what lessons can be learned from the case studies and the method: to what extent was the score card useful to assess the adaptive capacity on the local level and with respect to individual responsibility, and what lessons can be learned to improve the adaptive capacity?

4.2 Description of the region

The municipalities of Zaandam and Wormerland, located in the southeast corner of the Zaanstreek region, are build upon water impermeable peat-on-clay soils. In the … century, most peat was cut for energy use, leaving behind fertile agricultural clay land. The direct connection with the sea in combination with the water impermeable soils have always posed inhabitants of the region with major water challenges. On the one hand, peat and clay because of their high density retain large quantities of water. The high water levels created nutrient rich marshes. On the other hand, to cut the peat and to cultivate the land, it was necessary to drain the water out of the area. This is why over the centuries people have constructed several dykes and installed numerous mills that were working every day to keep the water levels low. These historic developments still affect the current land structure. The area is characterized by right-angled agricultural plots separated by ditches, with several small to medium, narrow stretched villages diffused over the area.

Around the year 1975 several of the small municipalities integrated into one large municipality: the municipality of Zaanstad. This municipality is for a large part urbanized: the old village centres are extended with newly build residential areas on the outskirts parted by green agricultural and nature belts. The largest city within the municipality is Zaandam. Here people still suffer from groundwater problems after a period of heavy rain: this may cause streets to flood after which it is hard to drain the water out of the area. Several housing development projects are initiated within the municipality. Within the city there is the Inverdan project, which also should bring more space for water retention. The city of Zaandam has in the last couple of years undertaken quite some interesting initiatives to inform residents about their own responsibility. For example, in 2004 the Dienst Wijken has in 2004 published an information brochure about local groundwater problems in which it addresses the responsibilities of itself as a municipality but also that of residents. This year, they also published a brochure on municipal sewer construction proceedings in which they acquaint residents with the possible effects of these pro-

ceedings on their individual groundwater level and drainage task. In 1998 already, the municipality established the 'Gemeentelijk Adviesbureau Funderingsherstel', which functions to inform and support residents with the reparation of their foundations. Although this bureau is until now mainly focussing on foundation problems related to a frequent occurring bacterium, individual responsibilities are stressed.

On the outskirts of historic villages, housing estate projects have been launched, for example VINEX location Saendelft and the more recent extension Randzone Saendelft. In planning those extensions, water has been explicitly taken into account. In Saendelft for example, it was decided to integrate water retention in the green zone that was established next to the residential area to compensate for the increased paved area and to face up to the impacts of climate change. The planning process around Randzone Saendelft has started in 2003. The aims are to build more residences, and to realize an area in which nature, leisure and water storage are integrated in the area that now functions as a drainage area for the rest of the district. In 2003, it was already obligatory to apply the water test to spatial plans. The local water board, on the basis of a review of its general water task in the area in the light of climate change, took the planned building activities also into account to impose itself with a water retention goal for the area. At the start, the local water board was looking to establish one specific water retention area: the Noorderpolder (Provincie Noord-Holland 2004[12]). But recently, it has decided to follow a different approach: to look for more small, flexible and integrated solutions to meet the water storage obligations (Randstedelijke Rekenkamer 2008[13]).

The municipality of Wormerland, located north of Zaanstad, is also an agglomeration of different, small village centres. More than the municipality of Zaanstad, this municipality is characterised by old rural town centres and extended agricultural and natural lands. One of these agricultural areas is polder De Wijde Wormer, drained in 1626. The marches, which provide rich grasslands, are mainly used for cattle breeding. In 2006, the polder provided for 70 hectares of open water (HHNK 2006[14]). The local water board, following the obligations set in the Nationaal Bestuursakkoord Water (NBW), conducted a study to reassess the risks of flooding in their area in the light of new climatic circumstances. One of the results of this study was that in the polder De Wijde Wormer the flood risk was too high, and that an extra 38 hectares of open water was needed (HHNK & Provincie Noord-Holland 2004 [15]). At the same time, other parties were laying claims on the polder: farmers wanted to improve the agricultural structure, nature organisations wished to enhance the ecological quality and the municipality was aiming to better access the area for recreational purposes.

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12 Provincie Noord-Holland (2004) Streekplanuitwerking Randzone Saendelft. Online available: http://www.noord-holland.nl/Images/65_64902.pdf [16 December 2008].

13 Randstedelijke Rekenkamer (2008) Puzzelen met de Wateropgave – Provincie Noord-Holland, p. 41. Online available: http://www.randstedelijke-rekenkamer.nl/userfiles/pdf/Puzzelen%20met%20de%20wateropgave%20-%20Noord-Holland.pdf

14 HHNK (2006) Verkenning inrichtingsplan De Wijde Wormer.

15 HHNK & Provincie Noord-Holland (2004) Bescherming Wateroverlast Noorderkwartier. Online available at: www.hhnk.nl/aspx/download.aspx?File=/contents/pages/54788/hoofdrapportbwn.pdf [17 December 2008].

At first, the local water board was searching for space to create a pool to achieve their water retention goal at once. But interestingly, gradually the approach changed into one where they are increasingly looking for integrated small-scale solutions. In 2005, it was decided to establish a steering and project committee in which all parties with a stake in the area were represented to guide the restructuring of the area. The steering group aimed to integrate the different goals set out for the area to search for ways to combine different subsidy flows and to find 'win-win' solutions.

4.3 Perceptions with respect to individual responsibility

Are social actors aware of the changes in responsibility as a result of the paradigm shift towards individual responsibility in the adaptation issue in particular and in politics in general?

From the interviews, it can be derived that most interviewed do not recognize a change in the division of responsibilities over the last years. However, they do experience a growing consciousness of the division, partly because this division is increasingly a topic in discussions on local water problems. Interviewees not only perceive an accentuation of private party's own responsibilities, they also notice an increasing emphasis on the responsibilities of other parties. It is not felt that this trend is solely set off by the national government. Many indicate pressing local water problems and a general growing awareness as an input of this trend.

One example that is often mentioned in this respect is the water test (watertoets), a test to examine the effects on local water conditions that is obligatory to perform in every planning activity since the institution of the National Regulation Agreement on Water (Nationaal Bestuursakkoord Water: NBW) in 2002. The reason the test was introduced in 2002 was the increasing difficulty local water boards had with keeping the water system up to its current standard while municipalities continuously laid claims on open land for spatial developments. The water test arranges that for every spatial plan, the effects of the plan on the water system should be assessed. It further provides that negative effects resulting from the plan should be compensated within the planning area by the project developer. The project developer can be the municipality or a private party. In practice, the water test functions as follows. For every spatial development plan, the municipality has to issue a permit and/or change the 'zoning plan'. In this stage, the plan is presented to the local water board. They in turn make an assessment of the effect on the local water system and accommodate the plan with a recommendation: whether is it sensible to proceed the planned building activity, if so what assurances have to be met to confine the negative effects e.g. how many square meters of open water to compensate for increased paved area and building standards, and if not they often suggest another more suitable location. The municipality then decides on the basis of this recommendation to issue the permit or not. The municipality is not obligated to follow the advise of the local water board. Apart from the water test, the local water board can test new spatial plans to their own 'keur', which is equal to a municipal zoning plan. For spatial plans that contradict their keur, a 'keurdispensation' must be issued.

With the water test, interviewees feel that responsibilities of different parties are emphasised. On the one hand the continuous responsibility of the water board to safeguard

residents from water troubles under changing spatial circumstances. And on the other hand the responsibility of spatial planners – be it the municipality or a private party – to prevent negative effects on the local water system, and the responsibility that if they do cause a negative effect, they have to compensate for it within the planning area.

As mentioned in the section before, the municipality of Zaanstad is increasingly stressing individual responsibilities of their citizens concerning water management. This trend is set in by the CIW report (see section …), of which the results highly influenced the later installed WGW. These policy developments clarified the division in responsibilities between municipality and residents. Moreover, it is felt that residents almost automatically look at the municipality for solving groundwater problems, while they do have their own responsibility and possibilities to act upon these responsibility. Because the municipality of Zaanstad is expecting to suffer from more water problems in the future, the municipality is already putting effort into communicating rights and duties to its residents. The already mentioned information brochures are one example. Employees of the municipality furthermore visit district meetings to inform residents about their responsibility.

How is this perceived? Is the shift in responsibilities clear and logical and will it in general enhance adaptive approaches?

Here is it important to make a distinction between the experiences with the division of responsibilities in the city of Zaandam and that in de polder De Wijde Wormer. Overall, the sharing of responsibilities in Zaandam is experienced as more difficult than that in De Wijde Wormer.

Within the city, all parties are aware of the official responsibility of house and land owners to safeguard their property from water inconveniences. This responsibility is in principle not felt as problematic: house owners have to make sure their water drainage meets up with the standards and this is not a difficult thing to do. However, it is when problems in the water system arise, that this responsibility becomes a topic of discussion. It is the responsibility of the municipality to provide sufficient public sewer drainage for residents to drain their water into, and the responsibility of residents to make sure the water is drained from their property. If one of those parties fails water problems arise. But then there are also certain circumstances that are considered outside the influence of any party, for example a very large amount of rain, for which no precaution measures reasonably should have been taken. When this happens, another responsibility of the municipality, that of maintaining the liveability of the public area, comes into play. In practice, when a street is flooded, the municipality often comes to aid by providing first relief measures. However, it is not always clear out of which responsibility the municipality is acting at such times: is it acknowledging it failed in providing a good public sewer system, or is acting out if its communal responsibility to maintain the quality of the public space? Residents often interpret relief measures provided by the municipality as a confession of guilt. In contrast, the municipality in some instances explains it as an act of solidarity: they provide the measures out of their social duty to maintain the liveability, and herewith take over the responsibility of residents that should have solved the problems themselves. This overlap in responsibilities is confusing. It is not felt that the WGW brings much clarification on this topic and that it leaves a lot of room for different interpretations of the duty of the municipality.

Another example of the difficult division of responsibilities between residents and municipality is around the construction of a separated sewer system. National legislation stimulates municipalities to change to a separated sewer system instead of the old fashioned mixed system. Instead of the accustomed drainage of one water pipe that transports the households water into the municipal sewer, households now need two separate water pipes to transport their water: one for clean rain water, and the other for 'grey' waste water. Once the municipality decides to construct a separated sewer system, it officially belongs to the responsibility of landowners to transform the individual system as well. In practice, it remains unclear when and how residents actually should transform their private system.

The result of this blurred division in responsibilities is that within the city of Zaandam, residents often look at the municipality as the responsible party for local water management, but do not know the exact boundaries of that responsibility. The city management on the other hand, is trying to stress the responsibility of residents themselves and at the same time is trying to live up to their public responsibilities.

In the rural area De Wijde Wormer, the different parties do not experience the division of responsibilities as problematic in practice. Partly this is presumably due to the fact that the main focus is on the realization of a future water retention goal and not on immediate water problems like flooding.

But that can explain not all. Many interviewees point to the awareness of the importance of water retention among farmers active in the area. Floods in 1994 and 1998, and a recent study of Landschap Laag Holland, have contributed to this. This awareness is also present among private parties, e.g. farmers, nature organizations and residents. Moreover, farmers have a more direct stake in good water management than residents: their income is directly relying on local water management. Although farmers do not experience their responsibility of drainage of their own land as difficult, they do look at the local water board as the main party responsible for mitigating water problems.

The fact that the division of responsibilities between parties is not experienced as negative or problematic can possibly also be explained from the approach that is chosen to achieve all aims specified for the polder. As explained above, from the beginning a steering group with all stakeholders was set up to think about the restructuring of the polder. The behind lying idea was that together, they could find smart, integrated and win-win solutions, and thus be more effective in achieving the aims of all parties. All involved parties had their own responsibility, and those responsibilities were clear to all other parties at forehand. Interviewees indicate that this understanding of each other's role was important for finding optimal solutions. A division of responsibilities for local water management between different parties is therefore not seen as a problem. On the contrary, it is seen as an opportunity to enhance an integrated, optimal approach.

The approach in De Wijde Wormer has lead to some interesting applied methods, like the method of 'land consolidation'. Land consolidation is a possibility laid down in law, where land is exchanged between parties in mutual agreement. Farmers often own several plots of land diffused over an area, and exchanging land is a way to gather land located more close together. This improves the manageability of the farmland. In De Wijde Wormer, this approach historically used for agricultural improvements, has been extended to also incorporate water, nature and recreational aims. By considering all the

aims together, win-win solutions are sought, for example exchanging agricultural land against land owned by the local water board. This example actually took place in De Wijde Wormer.

4.4 Scoring of adaptive capacity / Assessment of criteria

***Variety*: Do the institutions allow for all kinds of problem framing and solutions, engage all relevant actors and promote diversity of solutions?**

Individuals do not experience their responsibility as difficult. Actually, they feel their responsibility is quite clear: they have to make sure the water drainage on their land is sufficient and constructing water pipes easily does this. It is not their own responsibility that they see as problematic, but moreover the division in responsibilities between different parties in practice. This division suffers more criticism among interviewees in the city of Zaandam than among interviewees that are related to the polder De Wijde Wormer.

Within the city of Zaandam, a top-down approach from the level of the municipality is indicated, mainly in relation to the sewer maintenance. The decision to construct a separated sewer system is solely taken by the municipality. This decision affects individuals: they have to make sure their private drainage system is connected to the new sewer. This can costs the individual up to 4000 euros, while he or she has no saying in when or how this is taking place. In practice, it almost never happens that the individual must transform his system immediately – in most cases individuals are allowed to incorporate it in the next building renewal he or she undertakes. But still the individual feels posed with a top-down regulation.

Furthermore, in Zaandam it is felt that the city managers have a monopoly in framing problems and therewith limit the total array of solutions. It is often unclear whether a risk is structural or incidental. Incidental problems are seen as risks for which the municipality has no direct responsibility (like extreme rainfall), while structural risks should be handled by the municipality because it detriments the quality of the living area or because is it caused by a deficient sewer system. In practice, it is the municipality who decides by labelling problems as structural and thus taking responsibility to provide a solution or not labelling them as structural and thus denying responsibility for it thereby leaving it to residents to handle the problems. A lack of clear norms on what are structural and what are incidental water problems is seen as a cause of this problem.

In De Wijde Wormer, individuals do not feel burdened with top down regulations. Land consolidations are voluntary and therefore only take place when all parties receive benefits from the exchange. The local water board, one of the initiators of the restructuring approach, explicitly employs an open view. The local water board decided to install a bureau to achieve all its water aims following out of the flood risk assessment study by 2015. This bureau was given funding up to the amount of one third of the total costs and a large mandate. In other words, the bureau was stimulated or compelled to look for solutions in cooperation with other (market) parties to scrape the money for achieving all aims but at the same time was provided with a high degree of flexibility to decide when and how to tackle what problems. The only ‘hard’ goal this bureau was given is to have

tackled all identified problems before the end of 2015. This evidently leaves room to search for 'best' or 'optimal' solutions that are location and time specific.

The chosen strategy of land consolidations to achieve all aims also is experienced as an approach that broadens the scope for finding adaptive solutions. It encourages a search for solutions that are fine-tuned to location and time specific factors.

***Learning Capacity*: Do the institutions allow social actors to trust each other, discuss doubts, learn from experience and maintain memory of past events?**

When taking the level of trust into consideration, the distinction between the city and the polder is again relevant. Shortly, in Zaandam trust between different parties is significantly smaller than in De Wijde Wormer.

In Zaandam, residents and real estate agents feel not much involved in water decision process. They feel imposed with new sewer systems and dependent on decisions of the municipality.

In the polder De Wijde Wormer, the initiated process seems to stimulate trust between parties. Being acquainted with the stakes and interests of other parties in an open process and therefore understanding why parties take a certain position in discussions certainly seems to help in this respect. Moreover, the integrated local area approach lays down a structure of cooperation that makes it attractive for new parties to join. Not only does this structure bring together new ideas and parties, also knowledge about available funding and the administrative context is shared.

On the other hand, a lack of trust is also indicated between farmers and the local water board. Farmers and local water board employees have a long history together: they are used to be dependent on each other's for performing their tasks adequately. Since the centralization of the many small local water boards in … however, the distance between water boards employees and farmers has grown. Moreover, the daily work of water boards has become more subjected to norms and new technologies: models and computers fix more and more the daily policies of the water boards. Farmers still look at the local water board as the main one responsible for the water system, but decreasingly understand the choices made. Some respondents feel that water boards should do more in communicating and explaining their policies to farmers to enhance trust. Interestingly, the municipality makes the same comments: they too expressed having difficulties understanding the demands the local water board is placing on them.

***Ability to act*: Do the institutions allow social actors access to information, the ability to act according to plan and room to innovate if necessary?**

An important element for the criterion of ability to act is the availability and accessibility of information. Especially within the city of Zaandam respondents do not have detailed knowledge of local water conditions. They do not indicate this as a problem however: they feel that they have sufficient information and means to perform their own task satisfactorily.

In the city, respondents do point to a lack of awareness of groundwater problems among different parties. Groundwater problems, it is already in the name, are problems that oc-

cur below ground level and are therefore invisible to the 'normal eye'. Both governmental parties and private parties point to this as a problem. Residents feel that because Groundwater, sewer and foundation problems are not a 'sexy' problem, they do not appeal to politicians. Therefore, they do not generate the attention and economic resources they should. At the same time, employees of the municipality indicate the invisibility of groundwater problems as an obstacle for residents to act upon them in those areas where they are responsible, i.e. at their own parcel. This especially poses the municipality with a problem: after all, the official responsibility of the municipality to maintain the quality of living in the public space is dependent on the upkeep of foundations by house owners. When house owners neglect their duty at their own parcel, problems shift to the public space and become the responsibility of the municipality.

The municipality is undertaking different initiatives to inform residents about groundwater problems and individual responsibilities. The already mentioned information brochures are one example. Another example can be found in the founding of the Municipal Bureau for Foundation Repair in 1998 to raise awareness of possible (invisible) foundation troubles among residents and to support residents in solving problems. The Bureau is spending a lot of its time on researching the current state of foundations in the city of Zaandam, and disseminating results from those studies to make people aware of problems. Also, the bureau assists residents who want to do something about their foundation financially: they take over the costs of commissioning a technician to sketch a construction draft for improving the foundation and residents can apply for a small reduction in the costs of actually reconstructing their foundation. It should be noted that these financial contributions are only available to residents of building blocks that lie in an area that is identified as 'foundation-problem-area' who altogether decide to do something to improve their foundations, because these residents are least likely to take the initiative to improve their foundation themselves. The Municipal Bureau for Foundation Repair booked successes: indeed more foundations have been improved, and they notice an increased attention among house brokers for the results of their studies. Although the bureau until now only focuses on foundation problems that result from a frequently occurring bacterium, the instalment of the bureau does indicate a trend towards stressing individual responsibilities and informing residents about this.

Overall, knowledge of (invisible) groundwater problems is considered as a crucial element in strengthening and clarifying the responsibilities of different parties and in enhancing the adaptive capacity. Proposals to assemble and disseminate this knowledge are: include a water section in every buying contract, include water aspects in the already obligatory constructional report, design a water label for buildings just like the recently introduced energy label, apply a low tax tariff for foundation reconstruction (just like is the case now for painting etc), or make foundation reconstruction works tax deductible.

Respondents in De Wijde Wormer feel that there is a growing awareness of the need to take prevention measures to mitigate the expected negative effects of wetter weather conditions. As already mentioned, floods in the last decade of the 20th century and studies on this subject helped to raise this awareness.

However, respondents also indicate a lack of awareness relating to possibilities to react to the negative impacts of climate change that cannot be prevented or mitigated. It is expected that farmers in De Wijde Wormer will suffer mainly from rising temperatures and

lower water levels in summer for example. This will cause salinization and the outbreak of pests and diseases. Farmers need to diversify their production, but awareness of this problem and solution is lacking among farmers. Among other things, this is attributed to the heavy dependency of the cattle-breeding sector on European subsidies and to the high transfer costs of diversification. There are some initiatives in the area that try to increase the awareness and ability to act. Landschap Laag Holland in 2002 founded the 'Innovative Entrepreneurship Office' (Loket Vernieuwend Ondernemerschap) to disseminate information about national legislation and funding possibilities to nature-agricultural organizations. This office informs those organisations on their possibilities to act and stresses their need to act to adequately react to the impacts of climate change.

Also within the city of Zaandam, there are some concerns about the lack of attention paid to being prepared for the negative impacts like large-scale floods. But here, the idea is that the awareness should grow but that there is not much we can do to prepare ourselves for the negative consequences. When something like that happens, the municipality or higher governmental levels should come to aid.

***Leadership*: do the institutions support the rise of leaders who are visionary, entrepreneurial or promote collaborative work?**

In Zaandam, different interviewees point to the municipality as the sole one who takes the lead in city water management. This actor is however somewhat mistrusted and criticised in performing its accredited task.

In De Wijde Wormer, most respondents answer this question by attributing the local water board with the main responsibility for local water management (even the local water board itself). Overall, local actors positively experience the management of the local water board. Within the local water board, there is a lot of knowledge on the characteristics of the water system, they are the one who can assess the water system on an aggregated level and they are the one with direct contacts in the rural area. Leadership of this actor is therefore willingly accepted.

However, some comments are made on leadership in the restructuring process of De Wijde Wormer. Officially, the water board was assigned leadership in this process. But this kind of leadership is new to the water board: instead of imposing technical norms and responding to acute problems, the water board now had to steer a collaborative development process. It is felt that their inexperience in this respect is hampering the process somewhat. Moreover, because it is a collaborative process, respondents are not inclined to attribute leadership to one single party. More actors than the water board feel they take of have taken the lead in the process. Although this organization is positively valued for its collaborative character, it is at the same time criticised for its lack of leadership. After a few years, DLG officially took over the lead in restructuring De Wijde Wormer. But respondents still experience a lack of leadership: until now, only one land consolidation has actually taken place, and the progress is more or less at a stand still.

Some say the province should take more lead in adapting the water system to new climatic conditions. At this level, the subsidies are allocated, and because of this it is though that provinces can look for integrated solutions. But it is the conviction of the province of Noord-Holland that these kind of integrated solutions should be found at the

local level, and the management of the water system belongs to the domain of water boards and municipalities.

***Resources*: Do the institutions generate the necessary mandate and economic and human resources?**

The case study in the Zaanstreek region shows that there is little direct financing available for adaptation goals. Many respondents qualify the 'Investeringsbudget Landelijk Gebied' (ILG) as an important financial instrument to fund integrated adaptive solutions. The land consolidation that took place in De Wijde Wormer is partly funded by this national budget. The ILG aims to integrate goals and herewith brings different sectors and parties together. Provinces administer this budget. Officially, the ILG is supported by the Ministries of LNV, VROM and V&W. But in practice, as many respondents indicate, LNV aims are dominant. Up to now, the budget only finances agricultural and nature goals. Some respondents think the aims of this budget should be broadened to also include water goals to encourage adaptation. Not everyone agrees. Some say that it would not make a difference, because everything that you do in the area connects to water somehow and that it is therefore not difficult to use the money to also meet water goals. Other argue that water goals are already paid for out of the taxes local water boards raise and that it would therefore be unfair to also use the money for water goals. Apart from these comments, the ILG is seen as an important incentive to stimulate an integrated, flexible and adaptive approach.

In De Wijde Wormer, current financial arrangement from the water board to stimulate farmers to make parts of their land available for water storage only compensates farmers for the reduced income that results from less cultivated land. To really stimulate farmers, it is felt that this arrangement should go further and provide a real financial incentive to win farmers over: why should their change their habits when the (financial) end result is the same? The water board is aware of this situation, but argues in its defence that it can only compensate for loss in market value because it has to answer for spending taxpayer's money.

With regard to the question if the institutions provide for sufficient authority and mandate for adaptation, the following points can be made.

Overall, the water test is seen as an instrument that strengthens the position of water boards as the one who is looking after water safety interests. But it still leaves a lot to be desired according to some. The main point of criticism focuses on the fact that although the water test is obligatory; to act upon the results of the test is not. The test is performed without any obligations attached. It offers no compulsory tools to ensure that detrimental effects on the water system are prevented, let alone ascertain that adaptation goals in the water field are taken into account. Some hope the new WRO (Spatial Planning Law) will offer more enforcing instruments, like an obligation to act upon the advise of the water board or a more enforceable form of land consolidations. Not all would agree however that more compelling instruments enhance the adaptive capacity at the local level.

Interestingly, the in the NBW established compulsory compensation of paved square meters with open water by the project developer also is subject to criticism. This incentive is criticised for being too fixed and too inflexible. Especially the municipality feels that it

is not always reasonable and most optimal to ask for compensation at the same time and at the same location as the spatial development takes place. They argue for a more flexible instrument like a 'water transfer bank' to make sure the balance over a certain time and over a certain area is guaranteed.

Another point respondents make with regard to authority and mandate is that not at every level actors support or back up land consolidations. The agricultural sector has been using for years now, and more recently the water board also sees the benefits. But at higher level, DLG and BBL, a more static and strict strategy is put into practice. They only want to buy land to create water storage there, and are not open to exchanging land and creating water storage at a location not designated by their internal studies as optimal. This hampers the adaptive capacity at the local level, it is felt.

Fair governance: Do the institutions allow for legitimate policy processes that support equity, respond in time and are accountable?

Overall, respondents consider the current distribution of responsibilities for local water management fair.

As explained above, interviewees do point to a lack of norms concerning structural and incidental water problems. Because of this, it is not clear who is legally responsible for solving water problems at hand and the issue is settled by the municipality based on their own interpretations.

Especially within city it is hard to hold the municipality and water board responsible for water problems/damage because of the many problems that can be at the cause. Climatic circumstances, bad sewer maintenance, bad private land management and effects of nearby construction works all influence local water conditions. Respondents indicate a lack of accountability in this respect.

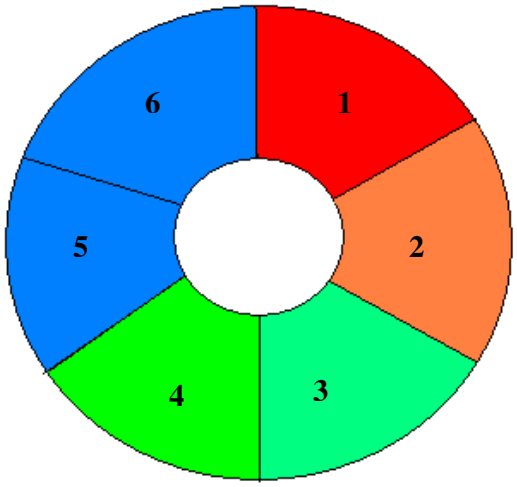
Last point that is put forward by interviewees relating to fair governance, is the question how much knowledge can be expected from residents, and who must pay for this knowledge. Is being informed the responsibility of private parties, or is it the task of the government to provide residents with knowledge?

4.5 Inferences

What can be concluded about the adaptive capacity of institutions at the level of the individual in the Zaanstreek region – i.e. the municipality of Zaandam and the polder De Wijde Wormer?

Considering the divergence in results between the research in the urbanized municipality and the research in the polder, we will consider the adaptive capacity at the local level separately. First we will say something about the Zaandam and thereafter about De Wijde Wormer. To conclude with, we will make some comparisons between the two.

We have tried to colour the Score Card of Adaptive Capacity, the result of this attempt is shown below.

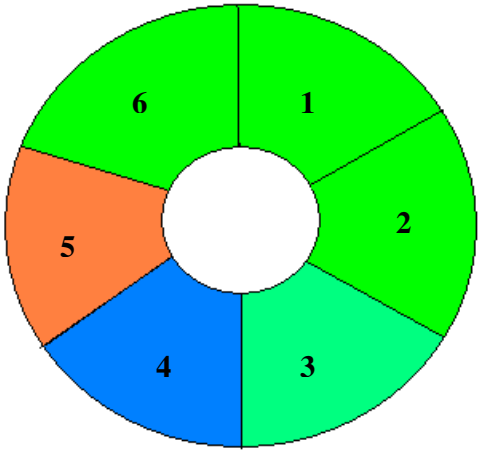


1	Variety	Negative score
2	Learning Capacity	Sligtly negative
3	Ability to Act	Slightly positive
4	Leadership	Positive score
5	Resources	Neutral score
6	Fair Governance	Neutral score

Figure 4.1 Adaptive Capacity Score Card applied to the municipality of Zaanstad

1. Within the city of Zaandam, respondents negatively experience top-down regulations from other parties.
2. Different parties somewhat mistrust each other. Individuals feel not much involved in local water management.
3. Most parties are satisfied with their own knowledge and capability to act. The only concerns that are articulated concern the ability to act of other parties: a lack of awareness and visibility of groundwater problems. Within the city, quite some initiatives are taken to inform residents about their responsibility, and to provide them with knowledge on how to act upon that.
4. The municipality has, according to all respondents, the lead in adapting the local water system to changing circumstances.
5. Within the city, some financial resources are available but the general opinion is that more is needed. Also, some instruments are available that provide different parties with some mandate, but also on this topic interviewees see room for improvement.
6. Difficult accountability procedures, but overall considered fair.

This (rude) assessment of the adaptive capacity of institutions within the municipality of Zaanstad provokes some interesting thoughts. For example, top-down regulations are experienced as negative: residents feel imposed with regulations from the municipality and the municipality feels imposed with regulations from the water board. At the same time, different actors are satisfied with their capabilities to act: they do not feel limited in their actions. Moreover, the strong leadership role of the municipality is not contested. This could indicate that urbanized areas need a clear division of responsibilities that is regulated somewhat top-down. Many different people are involved in local water management, and all parties are dependent on each other for achieving good results. This asks for good accountability procedures (which are lacking at the moment).



1	Variety	Positive score
2	Learning Capacity	Positive score
3	Ability to Act	Slightly positive
4	Leadership	Neutral score
5	Resources	Slightly negative
6	Fair Governance	Positive score

Figure 4.2 Adaptive Capacity Score Card applied to the polder De Wijde Wormer

1. The integrated local area approach stimulates the search for optimal, time and place specific solutions and herewith allows for a diversity of problem frames and solutions.
2. The approach in which different parties are together looking for shared benefits enhances trust and stimulates learning capacity. The only point of criticism that is made is that there is some mistrust between farmers and the local water board.
3. Through the collaborative organization, knowledge is shared between parties. Although no blueprint plan is present, respondents do not feel limited in their ability to act. A lack of awareness and plans in case of emergency situations, like extreme rainfall or the outbreak of diseases, is indicated.
4. Collaborative leadership in De Wijde Wormer is very strong. However, actors do experience difficulties with leadership in the restructuring process of the polder. An open approach allows everyone to join in, but does not evidently lead to the rise of one leading party.
5. Overall, respondents feel that budgets for achieving water aims are insufficient. And although respondents recognize the positive influence of some recent introduced incentives like the water test, mandate to force actors to take water into account are lacking. Should be noted that not everyone sees this as a problem.
6. The division of responsibilities and democratic content of the institutions are considered fair.

The assessment of the adaptive capacity of institutions in the polder De Wijde Wormer also provides ground for some interesting observations. The open, local and integrated approach allows for the development of flexible solutions. Actors feel that they are endowed with much space to manoeuvre: the institutions allow for autonomous adaptation. People are satisfied with the approach: they value the democratic and fair governance structure. The disadvantage of such an approach may well be a lack of steering: a lack of leadership and also a lack of funding. In an area dominated by agriculture, like De Wijde Wormer, this approach seems to be fruitful. This is probably partially caused by the fact

that is it relatively easy to gain a clear view of the situation: not many different individuals are involved and those who are mostly have a direct stake in good water management.

5. Case Study 2: Delft

5.1 Introduction

In this chapter, we will depict the main results from the case study conducted in the municipality of Delft, located in the province of Zuid-Holland. This chapter will employ the same structure as the last. First, a description of the region will be given. Then, we will go into the perceptions and experiences among interviewees with regard to individual responsibilities and adaptation in the water field in the municipality of Delft. Last, we will connect those results to the six dimensions of the Score Card for Adaptive Capacity to try to make an assessment of the adaptive capacity at the individual level within the region.

5.2 Description of the region

The city of Delft has a strong historical connection to water. In the 14th and 15th century, the city functioned as an important harbour along major industrial shipping routes, for example that of peat and beer. The old city centre is still characterized by small waterways and narrow alleys that date back to those times.

The municipality of Delft, in which the city of Delft is located, is build upon sand on peat soils. These water impermeable soils have always posed water managers with difficulties. The bedding down of peat soils causes the ground level to subside every year. Especially in the inner city of Delft this process is evident. To date, the ground level of the inner city lies only 10 centimetres above water level. Moreover, at this moment the municipality is one of the most built upon areas in the Netherlands: about 70 percent of the area is paved. Because natural drainage only makes up for 30 percent, rainfall has a strong influence on the water level in the municipality and demands close management of the local water board Delfland.

It might not be surprising that the municipality has undergone several small instances of floods over the years. Maybe this is why the city now inhabits some of the most well established knowledge institutes in the water sector, like the Technical University Delft, TNO, Deltares and the UNESCO Institute for Water Education. But the city has not abandoned all its industrial activities. Still, some major industries can be found in the area, among which the DSM factory.

The city of Delft has for quite some years served as an experimental plot for newly developed water technologies. All through the city, more and less innovative water management strategies are applied. For example, the municipality stimulates the disconnection of the relatively clean rainwater from the sewer system (*afkoppelen*) to increase the capacity of the sewer and prevent flooding of the sewer in times of heavy rainfall to avoid the overflow of detrimental grey water into the natural drainage system. The municipality for example subsidizes the purchase of rain barrels, and the Wippolder neighbourhood has received an innovative rainwater drainage-and-infiltration system. Another example is the neighbourhood Tanthof, which has been provided with its own micro-water system, fully disconnected from the water systems around and independ-

ently managed for that neighbourhood alone. Furthermore, to alleviate the water management of the inner city, it has recently been decided to implement a new technology in some of the major canals that can disconnect the eastern part of the inner city water works from those outside. When the general water level increases, for example as a result of rainfall, the inner city that can only cope with the relatively small increase in water level of 10 cm. can be cut off.

Apart from these technical solutions, the municipal government is undertaking several other initiatives to improve local water management. Together with the water board of Delfland, they have in 2000 published a water plan for the Municipality: *Waterplan Delft: een blauw netwerk*[16]. For the municipality and the water board of Delfland, this municipal water plan and the revised '*Nota Waterdossier Delft*'[17] from 2005 form important guiding documents for water management. In these document short-term and long-term strategies with regard to water developments within the city of Delft are envisioned. In the revised document, a new retention goal of 325 hectare within city borders is submitted, as well as an executing plan. In this executing plan it is specified that half of this retention goal will be fulfilled by the municipality offering public space to the water board, and the other half will be provided for through commercial spatial developments. In the last case, the water compensation rule is used to generate space for water retention.

Within the municipality, the function of water coordinator has been created to guide all developments that relate to water. The municipality informs its inhabitants when new water plans are about to be implemented. Those meetings are normally well attended. Some regular meeting structures have formed, for example the biannual meetings between the municipal water manager and resident's organizations and the gathering of the sustainability platform twice a year in which the municipality consults many different parties to make the municipality more sustainable.

5.3 Perceptions with respect to individual responsibility

How do social actors perceive the division of responsibilities for local water management? Are social actors aware of the changes in responsibility as a result of the paradigm shift towards individual responsibility in the adaptation issue in particular and in politics in general?

All interviewees are aware of the general division of responsibilities for local water management between parties, and explain them in relation to different water types.

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[16] The text of the water plan is accessible on the following website: http://raad.delft.nl/commissies/duurzaamheid/2000/nota/d_2000_013_n.html [18 December 2008)

[17] Gemeente Delft (2005) Nota Waterdossier Delft, 7 maart 2005, kenmerk 547960. Online available at: http://www.gemeentedelft.info/gvisapi/dsplug.dll?c=getobject&s=obj&sessionid=1VxDYXp1K38Ld!ziQW2AD1FIo9vhsYlyp7M0aGBJhXOuKEXXlWdpD8XH5Wf8xG1j&dsname=delftextern&objectid=18212&isapidir=/gvisapi/ [21 December 2008].

For sewer water, the municipality is considered the responsible party. Residents do have their own responsibility, namely to make sure their parcel and dwelling are rightly connected to the municipal sewer. As is the case in the Zaanstreek region, the city of Delft is also replacing its mixed sewer with a separated sewer system, and interviewees do indicate a responsibility of house owners to connect to this new sewer.

For surface water, the main responsibility is placed with the local water board. They are the one's responsible for the upkeep of all surface water. Other than in the Zaanstreek region, this responsibility is by all interviewees also placed at the plate of the water board for surface water within the city. Although it is acknowledged that the municipality also has a role to play, the end responsibility is still ascribed to the water board.

For groundwater, the story is more complex according to respondents. By some it is indicated that responsibilities for groundwater management are regulated nowhere in Dutch policy. All agree that groundwater is subject to the actions of many different parties and that responsibilities are therefore shared between several parties: end responsibility is arranged nowhere.

Like we saw in the Zaanstreek region, respondents in Delft also do not recognize a shift in official responsibilities. In Delft, responsibilities for water management seem to have been prominent for a long time now. Where respondents do notice a change however, is a recent trend set in by the municipality of involving more parties in city water management: housing corporations as well as the water board feel increasingly engaged in city water management. This shows that the municipal government is not willing to carry the full responsibility for local water management anymore. This does not indicate a shift in responsibilities according to respondents, but a more strict interpretation of the formal division in responsibilities as laid down in Dutch law.

How is the division of responsibilities experienced in practice? Is the division clear and logical, are bottlenecks and good practices identified, especially with regard to individual responsibility?

Again, when asked for their experiences with the division of responsibilities for water management, the question is often answered threefold.

Surface water suffers least practical problems it seems. Within the city, the municipal government used to take care of surface water management. But over the last years the municipality is handing over these tasks to the local water board, where the official responsibility for surface water lies. Most interviewees consider the transfer of responsibilities for surface water management to the local water board a good trend, because this places the overview at one party and increases the controllability.

Responsibilities for sewer water are clear on paper, but turn out to be somewhat indistinct in practice. To residents, it is not clear when and how they should connect their own drainage to new separated sewer system the municipality is constructing. They have not received any specific information from the municipality about this. Another implication of disconnecting rainwater from the sewer, is that rainwater now directly flows into the natural water system, i.e. trough groundwater into surface water. Herewith, responsibilities for rainwater are transferred to land owners and ultimately the local water board.

This was amongst other things reason for the local water board to establish the increased water retention goal of 325 hectares for the city.

Groundwater management is considered most problematic, on paper as well as in practice. Officially, every individual landowner is responsible for safeguarding its land against groundwater problems. The picture becomes more complicated when one considers that many different parties are all attributed with a partial responsibility: the province issues permits for the withdrawal of deep groundwater, water boards should make sure surface waters provide sufficient space for landowners to drain their groundwater into, landowners must establish good drainage of groundwater on their land, and the municipality has since the introduction of the WGW the vaguely described 'duty of care' to evaluate whether it can reasonably be expected from landowners to establish good drainage and if this is not the case take over this responsibility from the landowner.

Because of this structure in which many parties influence the groundwater system and in which many have partial responsibilities without one party supervising or carrying the end responsibility, causal links are difficult to establish. In practice, no one can be held responsible for preventing the origination of groundwater problems and it is very difficult to hold someone accountable for causing groundwater problems. Especially for individual house owners in the city this situation is difficult. It is indicated that many are not aware of their responsibility for groundwater drainage. And the ones that are, do not feel they have enough knowledge, means and influence to adequately deal with their responsibility.

One example often mentioned in the respect of groundwater is the case of the DSM factory of which the management has recently decided to stop their withdrawal of deep groundwater. DSM has been withdrawing large quantities of groundwater for years. Local water management has become adjusted to this situation. Stopping the withdrawal all of a sudden will therefore raise the groundwater level significantly and the water system is ill prepared for this effect. Legally, DSM is allowed to make such a decision although it places burdens others. House owners are concerned about rising groundwater levels on their land. Also, the municipality and the water board Delfland recognize the problem. They have therefore decided to maintain the withdrawal of groundwater themselves until the effects of stopping have been made visible.

Apart from the positive and negative aspects of the division of responsibilities for the three water types separately, respondents point to one more complexity concerning responsibilities for local water management that overarches the whole water system: that is that responsibilities in the public space are blurred. Especially for housing corporations who are being increasingly involved in (water) management of the public space, the official division in responsibilities is not clear. For example, it is not always clear who should make available the land for water compensation in the case of new social housing developments. Up to now, this is often arranged among the municipality and housing corporation themselves through negotiations on an ad-hoc basis. Housing corporations however do not indicate this as a problem: they see this as the evolving of a new structure of responsibilities that still have to take a definite shape.

Several respondents do indicate the ambiguous division of responsibilities in the public space as a problem in the light of individual responsibilities. The municipality is responsible for maintaining the quality of living in the public space and the house- and land-

owners are responsible for maintaining the quality of living on their own land. Like we saw in the Zaanstreek region, in Delft too the thin line or even overlap between those responsibilities is pointed out as a problem. When water problems arise in the city, the municipality often solves these problems and herewith takes over individual responsibilities. It is thought that this is one of the reasons that residents habitually look at the municipal government to solve their water problems. The municipality seems to be aware of this lack of clarity but is trying to ascertain individual responsibilities. In its policy note about water management in Delft it for example states that "the construction of drainage provisions does not content that the municipality is taking over the full duty of care for groundwater. Inhabitants of Delft therefore cannot deduce any rights from these activities. The construction of drainage provisions … contributes to the liveability of Delfts' districts. This will be communicated to the residents of Delft during construction works" (Gemeente Delft 2005, p. 9[18]).

5.4 Scoring of adaptive capacity / Assessment of criteria

***Variety*: Do the institutions allow for all kinds of problem framing and solutions, engage all relevant actors and promote diversity of solutions?**

Residents of Delft do not feel they possess a large variety of techniques to perform their own responsibilities in local water management. Most know some basic techniques like painting walls with a water-resistant paint and small plumbing maintenance. Interestingly, the majority does not experience this as a negative aspect. On the contrary, they are satisfied with their options at hand. They lack time to invest in problem framing and in finding adequate solutions and according to most there also is no need to invest time into this. After all, residents can rely on the specified knowledge of other parties for fulfilling their duty of safeguarding their own property against water problems, for example the knowledge of contractors, architects, juridical advisors and municipal authorities active in the city.

Housing corporations do have quite some different techniques at hand that they can use to live up to their responsibility as house and landowners. They have different options at hand in different situations: maintenance solutions like injecting walls for acute small problems like moist basements, emergency solutions like water pumps for larger scale problems like a flooded garden, and a internal decision structure in which management decides on structural solutions for structural problems with water.

Less clear-cut are the different possibilities at hand for housing corporations to fulfil their duties for water management in the public space. As explained above, the exact duties are not always clear and the management strategy is often decided in cooperation with the municipal government case by case. This is not perceived problematic, because housing corporations consider water management in the public space as a new field in

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[18] Gemeente Delft (2005) Nota Waterdossier Delft, 7 maart 2005, kenmerk 547960. Online available at: http://www.gemeentedelft.info/gvisapi/dsplug.dll?c=getobject&s=obj&sessionid=1VxDYXp1K38Ld!ziQW2AD1FIo9vhsYlyp7M0aGBJhXOuKEXXlWdpD8XH5Wf8xG1j&dsname=delftextern&objectid=18212&isapidir=/gvisapi/ [21 December 2008].

which experience is yet to be gained and more standard solutions will crystallize in the future.

The municipality, as specified before, is increasingly trying to involve private parties in city water management. Water board and housing corporations are involved through increasing cooperation. Residents are involved by informing them on the different possibilities they have to manage their own water conditions and stimulating them to take those measures. For example, the municipality has identified several techniques to disconnect rainwater from the sewer. Residents can apply some techniques themselves and the municipality is financially supporting this. The municipality also informs its residents about nature banks and water gardens.

A last point to make with regard to variety is that all respondents agree that variety is important. There is consensus about the need to take measures that suit the situation at hand: not every solution can be applied everywhere.

***Learning Capacity*: Do the institutions allow social actors to trust each other, discuss doubts, learn from experience and maintain memory of past events?**

From the interviews, it can be derived that several concerns exist with regard to trust between parties. First, it is often said that residents intend to look at the municipal government to solve their water problems. They already pay taxes, and the idea is that residents due to this have the feeling that they are no longer responsible for resolving water inconveniences. Also, some state that the municipally is inclined to think that residents do not understand their own interest in good water management and think that resident will not voluntarily cooperate. This is brought up as an explanation for the behaviour of the municipality in times of (mild) crisis: when for example a whole street suffers from water problems, the municipality often steps in and provides a solution, because it considers this the path that meets least resistance. Both tendencies are seen to reinforce each other: it is a vicious circle through which mistrust between the municipal government and its residents is continued.

According to respondents, there is another element in the institutional setting around individual responsibility for local water management that hampers learning capacity. It is the official duty of house owners to inform potential buyers on problems that affect the property, including problems with local water conditions. This creates a situation in which it is not in the advantage of the house owner to be aware of those problems: one cannot communicate what one does not know. Moreover, especially in the case of problems with groundwater for which responsibilities are unclear, some interviewees indicate that there is a resistance among several parties to seriously consider and tackle groundwater problems out of fear for being the first and therefore main one to be held responsible. This institution does not provide an incentive to house- and landowners to increase their understanding of problems, solutions and their own role in these. An obligatory water section in contracts of purchase is more than once recommended as a possible solution to this problem.

Furthermore, respondents point one more obstacle that relates to learning capacity. Officially, it is the duty of every party to inform others on its activities that (potentially) influence local water conditions. In practice, this does not happen very often. Respondents

think it is difficult to establish a structure for the exchange if this kind of information sharing.

Generally interviewees recognize the importance of increased cooperation of the municipality with other parties for the effect of enhancing trust between parties, although it has to be noticed that this cooperation mainly involves the local water board and housing associations and it thought to lack behind for individual residents. For the water board, municipal water plans are an important instrument in enhancing cooperation with the municipal government and strengthening its position in the city. And although the cooperation with housing associations leaves some room for improvement, this too is considered a positive tendency. Cooperation increases mutual understanding of each other's stakes and interest, it is thought, and therefore provides space for finding solutions that benefit both parties. Those 'win-win' solutions are more likely to be implemented and maintained.

Although in this cooperation the emphasis is still on short term, ad-hoc solutions, some respondents expect this to change in the future because of a growing awareness of climate change and because people will increasingly will be faced with the impacts of climate change. One example pointed out in this respect is that the city recently decided that the installed pumps in the canals of the inner city did not provide the structural solution to the ongoing water problems that was needed, and that the pumps would be replaced by a technique in which parts of the water works of the inner city can be closed off in times of wet weather conditions. Likewise, the increased water retention goal of 325 hectare within the city is seen as an indication that learning is taking place.

Last, several interviewees value the different initiatives that are undertaken at this moment to monitor local water conditions and the effects of (innovative) solutions all through the city. One mentioned example is the project '*Waterstad 2000*' that aims to collect data on groundwater levels within cities. A pilot for this project was performed in Delft in 2001 and still going on right now.

Ability to act/adjust: Do the institutions allow social actors access to information, the ability to act according to plan and room to innovate if necessary?

Most important point to be made here is one put forward by many interviewees with regard to the availability, accessibility and organization of existing information on local water conditions for residents and other private parties. As explained above, residents rely for a large part on the specified knowledge of others for the safeguarding of their property from water troubles. Contractors are almost always involved in reconstruction works and maintenance on buildings in the city. Interviewees point out that contractors often hand solutions to water problems. Apart from contractors, residents fall back on the information of other authorities. For example, *Bouw- en Woningtoezicht* – a Dutch Agency that supervises building and reconstruction activities – only issues building or renovation permits when sewerage and drainage plans meet the specified prerequisites. So when a building or renovation permit is granted, residents trust that all requirements are met. Furthermore, residents rely on architects to include all norms for buildings in their sketches.

As indicated earlier, most residents are satisfied with their acting space. Some however indicate that residents are too much reliant on the knowledge of others: when a problem arises, they say, residents sometimes do not know what to do or to what authority to turn to for a solution. Therefore, some argue for a more active role of residents in local water management For example, by keeping yourself as a resident up to date on the level of your groundwater, you will be able to foresee problems and act upon them at forehand in stead of reaction to them afterwards. Prevention measures are regularly cheaper and cause less stress than being forced to take relieve measures afterwards.

It is furthermore indicated that it is extremely difficult for residents who do want to inform themselves on local water conditions to find this information. Often, they do not know where to start: what information is available, en where it can be found. The problem is not that the information is unavailable, but that it is not organized in such a way that it is (easily) accessible for residents. Information is diffused among several parties. The municipality, the water board, research institutes, they all monitor and collect information on water conditions in the city. Again, this problem is most acute with regard to groundwater, because of its invisibility, the multiple parties involved and the vague division of responsibilities.

In this light, respondents positively welcome the new role ascribed to the municipality by the WGW of being the 'information bureau' on rain, waist and groundwater problems (see chapter 2). This new role obligates the municipal government to at least consider the information request of residents whether it can take up on the request or not. In most Dutch municipalities this new function of the municipality still has to take shape. In Delft, the process of starting up such a bureau is already initiated: although the bureau is not yet in place it is currently under development. Delft has appointed a water coordinator. Interviewees think this water coordinator, backed by the coming information bureau, can play an important role in collecting, organizing and linking the now diffused information on water related topics in the city.

Current national and regional governmental policy is primarily aimed at prevention of water problems. Not much attention is paid to increasing the ability to act in times of crises. The general idea is that when something bad happens, it is too late to really do something anyway. However, it is pointed out that especially in case of smaller crises, increasing the ability to act of individual parties can make a lot of difference. On the regional level, this idea has not yet penetrated. Nationally, some projects have been started around this theme. One example is the '*halve meter ramp*' (disaster of half a meter) project.

Leadership: do the institutions support the rise of leaders who are visionary, entrepreneurial or promote collaborative work?

Main parties attributed with leadership are the municipality and the water board of Delfland. A distinction is being made between leadership in the city area and leadership in the areas outside of the city. Within the city, people clearly look at the municipal government to take lead in local water management. In the outer areas, the water board is seen as a leading party.

This division in leadership is also reflected in practice. Within city borders, it is the municipality who takes the initiative to inform and involve its residents in water plans. Meetings around this theme organized by the municipality are well attended. Meetings organized by the water board for city residents show a small turnout. On the other hand, the meeting that the water board organizes for residents of the outer areas within the municipality attract lots of attendees.

The province has a negligible role when considering leadership in the municipality of Delft. The province considers it as a task of the municipality and the water board execute national water policy. There where a link with province's own nature goals can be established, the province is willing to act as an intermediary and look for integrated strategies.

***Resources*: Do the institutions generate the necessary mandate and economic and human resources?**

The deemed shortcoming of institutions around individual responsibility for local water management to generate sufficient knowledge (human resources) among residents has already been treated under the dimensions of 'learning capacity' and 'ability to act/adjust'. Residents indicate that they do not receive much information from the municipality about what is expected of them in local water management nor about what they could do to improve local water conditions. While it is thought that involvement of residents in municipal water projects can greatly enlarge the efficiency of municipal water projects. The separated sewer system for example works more efficiently when more residents connect their own drainage to the separated system, hereby increasing the returns of investment for the municipality. The municipality seems to be aware of this and is informing residents when they are constructing new drainage systems. The idea behind this is that when the municipality for placing the new drainage already opens up the street, this provides an opportunity for residents to connect their own drainage pipes without making the costs of opening up (part of) the street on their own.

The general belief is that the involvement of residents in the city of Delft can be enlarged. This is not to be realized only through financial incentives. Also, attention should be paid to increasing awareness of the need and benefits of residents' involvement among city dwellers. In practice this means that problem and solution should be comprehensibly communicated to inhabitants. Another important yet often overlooked factor is the consideration of the opportunities of residents to be involved: how much time and knowledge can residents invest? Generally, it is recommended to involve residents with a strategy that is adjusted to the local context taking desires and opportunities of locales into account.

Also, some observations are made in relation to the availability of economic resources to adequately organize individual responsibilities in local water management. In the Netherlands, water management is funded by a separate financial system: people pay taxes to the government for general public goals and apart from that they pay taxes to water managers (most important are the sewer tax to the municipality and water board taxes). This arrangement is installed to ensure that water never looses out on other public goals and always receives sufficient funding and attention. On the other hand, this means that no

general public funding is available for water goals. National subsidies that do address adaptation to climate change in the water sector are once only and non-structural.

This situation forces the municipality and water board to make a lot of effort to justify their level of water taxes and way of spending. They do not feel comfortable raising taxes sharply when the impacts of climate change are still for a large degree, and especially in their regional effects, uncertain. But they also do not have the financial resources to cover for all potential impacts. This sometimes results in complicated solutions in practice. For example, in case of the water executing plan (see ability to act section) the municipality and water board decided to generate half of funding that is needed to meet the water retention goal out of the market: private spatial developers are expected to supply ground for water retention as compensation for increasing the total of paved hectares within the municipality. Interviewees indicate that this turns out to be hard to realize in practice, because particularly social housing developers – that make up a large part of spatial development in Delft - often argue they do not have the money to buy extra ground to give to the water board. As a result, the municipality relaxes norms on percentages of social housing and allows housing developers to construct more dwellings in a high price range so that those developers are able to buy extra ground. In reality, this structure is causing a crumbling of the separation of water goals and other public goals.

Last, some remarks are made with regard to the institutions providing the necessasary mandate. The water test and the compensation rule are seen as good instruments to strengthen the position of the water board inside Delft's city borders. Those instruments have made it easier for the local water board to follow up on its own responsibility for surface water management. Moreover, the conceiving of the water plan by the municipality and the water board together has helped in this respect. Generally, the comment is made that water plans provide a good instrument to enhance collaboration, mutual understanding and 'win-win' solutions, and that it is therefore a pity that municipal water plans are still not obligatory. The new WRO does set out the obligation to include a water section in municipal spatial plans, to improve the adjustment of spatial plans to local water conditions.

***Fair governance*: Do the institutions allow for legitimate policy processes that support equity, respond in time and are accountable?**

Overall, the division of responsibilities *on paper* is considered fair. The water board being responsible for the water system as a whole, the municipality for maintaining the living quality of the public space including the prevention of water problems, and the individual for the maintaining of its own parcel. Every party is in essence responsible for the (effects of) activities that are undertaken by that party.

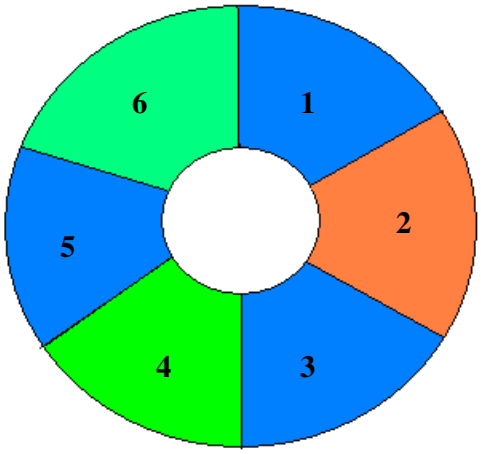
One problem that is put forward is the difficulty, especially for residents, to be informed about all the processes that influence groundwater conditions. Causal relationship are hard to understand and hard to prove. It is impossible for residents to be aware of all the interferences of the municipality, the water board or their neighbours in the water sys-

tem, and next to understand the effects of the interferences. In this respect, the question 'how much knowledge can reasonably be expected of individuals?' is often posed.

Another point being made with regard to fairness by many respondents, is that the question 'who will pay' remains difficult. Residents feel that they are imposed with costs of matters outside of their influence. For example, in times of (small) crises, it is expected from house- and landowners to take their own emergency measures while they are not at the cause of the problem. Also, the municipality is asking quite a high fee from residents who connect to the municipal sewer, while residents themselves have not chosen to replace the sewer system. Another example often brought up is the DSM case: who will foot the bill of DSM's decision to stop subtracting groundwater? Other fairness aspects are also treated under financial resources (see previous section).

5.5 Inferences

What can be concluded about the adaptive capacity of institutions at the level of individuals in the municipality of Delft?



1	Variety	Neutral score
2	Learning Capacity	Slightly negative
3	Ability to Act	Neutral score
4	Leadership	Positive score
5	Resources	Neutral score
6	Fair Governance	Slightly positive

Figure 5.1 Adaptive Capacity Score Card applied to the municipality of Delft

1. The range of problem frames and solutions at hand for residents of the city of Delft is not that large. Interestingly, they also do not seem to be asking for more variety: most are happy with their opportunities to turn to others (e.g. contractors, architects) to provide solutions. The municipal government is trying to increase the (awareness of the) array of solutions for residents.
2. A vicious circle of mistrust is identified between municipal government and residents. Moreover, several current characteristics of the institutional setting around local water management are seen to hamper learning capacity. First, it is not always beneficial for the individual to be aware of problematic local water conditions. And second, it is deemed difficult to establish a structure to exchange information on interferences in the groundwater system. On the other hand, the increased collaboration between municipality and water board and housing corporations is seen as a positive tendency that enhances mutual understanding and 'win-win' solutions. But, collaboration with residents could be improved.

3. A lack of comprehensibly organized information on local water conditions available to residents is experienced as an element that reduced the acting space of residents. However, some recent changes are positively valued in this respect (like the appointment of a water coordinator) and more positive changes are foreseen in the future (like the establishment of a municipal water information bureau).
4. No problems are indicated with leadership: the leadership of the municipally within city borders and that of the water board in the outer areas is subscribed, accepted and positively valued by all interviewees.
5. It is thought that placing more effort to involve residents in local water management could increase the efficiency of solutions significantly. With regard to financial resources, some difficulties are experienced with the distinct financial structure for water management in The Netherlands. And with regard to mandate, new introduced instruments like the water test and the compensation rule are seen as improving mandate, but more could be done in the future.
6. Overall, the institutional constellation around local water management is deemed to be fair. A lack of accountability mechanisms especially with regard to groundwater is indicated. Also, it is thought that the question 'who will pay?' will remain a difficult one, especially with more parties collaborating.

With regard to the above analyses of adaptive capacity at the level of individuals in the municipality of Delft, the following observations can be made. Although residents are not provided with a lot of variety in solutions, most do not seem to be waiting for more space to manoeuvre. They do however express they would be helped with more structure and clarity on what is expected of them and others, especially in relation to groundwater management. Of the different types of local water management, groundwater management is regarded as most problematic because of a complex and hazy division in responsibilities. As a result, different parties are looking at each other to take action; information is diffused among different parties, not organized and therefore not easily communicated to individuals; and accountability procedures are lacking. Within the city of Delft, people seem to be waiting for someone to take the lead in groundwater management, to establish rules and organization, and that someone is in many instances the municipal government. First steps by the municipal government to better organize things around local groundwater management are for those reasons welcomed. Surprisingly, people in Delft do not desire more variety but more clarity.

6. Comparative assessment, conclusions and recommendations with regard to individual responsibility

6.1 Introduction

In this chapter, we will shed our light on the results of the two case studies all together. What are the most important conclusions with regard to individual responsibility in local water management? How can the results of the case studies be interpreted in the light of adaptive capacity of institutions that surround individuals? And what lessons can be learned from this aggregated analysis for the organization of individual responsibility in local water management?

6.2 Comparative assessment of the case studies

Different persons experience individual responsibility in local water management differently. From the case studies in Delft and the Zaanstreek region, some general observations can be made with regard to the adaptive capacity of this institutional constellation however. In the table below, the results of Zaandam, De Wijde Wormer and Delft are summarized.

	Zaandam	**De Wijde Wormer**	**Delft**
Variety	Negative (-2)	Positive (2)	Neutral (0)
Learning Capacity	Sl. Negative (-1)	Positive (2)	Sl. Negative (-1)
Ability to Act/Adjust	Sl. Positive (1)	Sl. Positive (1)	Neutral (0)
Leadership	Positive (2)	Neutral (0)	Positive (2)
Resources	Neutral (0)	Sl. Negative (-1)	Neutral (0)
Fair governance	Neutral (0)	Positive (2)	Sl. Positive (1)
Mean score	**0**	**6**	**1**

Table 6.1: summarized results of assessments of adaptive capacity in case studies

As table 6.1 shows, the scores on adaptive capacity vary most between Zaandam and Delft on the one hand, and De Wijde Wormer on the other. Moreover, De Wijde Wormer has a significantly higher score on adaptive capacity than the two cities have. The case studies thus validate a difference between the context of a city and that of rural areas.

As the results of De Wijde Wormer demonstrate, in a small rural area a local, open and integrated approach in which different parties are voluntarily working together to find (amongst others) adaptation solutions that suit the area and the different participants best, works very well. It furthermore shows that this approach enhances the adaptive capacity at the individual level more than the approach applied in the cities: De Wijde Wormer ends up with a mean score of 6 while Delft has a mean score of 1 and Zaandam 0.

But in reality, the story is more complex. The general observation made above can be advanced by looking at the different dimensions of adaptive capacity separately. De Wi-

jde Wormer scores high on variety, learning capacity and fair governance. As explained in chapter 4, this results from the strategy that is chosen in De Wijde Wormer: the most important stakeholders are together and on a voluntary basis looking for small-scale 'win-win' solutions when good opportunities arise. More on the negative side are leadership and resources. And while the autonomous ability to adjust is high, there is no outlined plan for adapting the polder. These scores are also the result of the chosen approach. It lacks a straightforward plan and leadership, and therefore not enough resources are generated. This poses the danger of a process halt, which several interviewees indeed indicate as a problem facing the polder right now. But, there is a strong consensus about the quality of the chosen approach: the somewhat vague division in responsibilities provokes discussions and thus stimulates collaboration and the finding of win-win solutions that are inherently stronger than solutions imposed from above. The current approach is considered as the best way forward.

Looking at the dimensions of adaptive capacity in the cities of Zaandam and Delft shows different outcomes. Here, leadership and resources score relatively high. The municipal government clearly takes the lead in local water management, is more organized and planned, and is trying to increase the possibilities and means for action for individuals. This more top-down approach does hamper variety, learning capacity and autonomous ability to adjust within the cities. But surprisingly, as concluded in chapter 5, respondents in the city do not desire more variety or acting space for themselves, they are asking for more rules and a clearer division of responsibilities in areas where this is lacking which would possibly even further decrease variety and autonomous actions.

When the dimensions of adaptive capacity are considered separately, a more refined picture presents itself. The question comes to mind whether an assessment of adaptive capacity is or should be context dependent. Inherently, a city has a more complex structure: more people with more different occupancies live together in an area that is organized by some form of authority. The complex structure of a city, as the Zaandam and Delft results illustrate, seems to require more authority, rules, leadership and blue prints for action to provide individuals with sufficient means to adequately live up to their own responsibilities in local water management and thus to enhance the adaptive capacity of institutions at this level. Rural areas are characterized by a smaller number of people that show less variety in activities. Here, a local, flexible and integrated approach may serve best to enhance adaptive capacity at the individual level.

6.3 Conclusions and recommendations with regard to the adaptive capacity at the level of the individual

The question could be raised whether the conclusion that the adaptive capacity in De Wijde Wormer is indeed that much higher than that in the cities of Zaandam and Delft is justified. If an assessment of adaptive capacity is context dependent, as explicated in the previous section, a polder like the Wijde Wormer requires a different approach (and thus other dimensions adaptive capacity strengthened) to enhance the adaptive capacity than a city like Delft or Zaandam. This should be borne in mind when interpreting the results of the case studies.

A problem brought to the fore in both case studies is relating to the division of responsibilities in the public space and in groundwater management. Common in both problem

areas is an unclear and overlapping division in responsibilities between parties. Clarifying the division for all parties is thought to improve adaptive capacity in general, and thus also the adaptive capacity of individuals. However, it should be noted that this conclusion is mainly based upon interviews with respondents in city surroundings. In the polder De Wijde Wormer, people seemed to welcome a little haziness around the division of responsibly because this provokes discussion between parties, which in turn could increase collaboration. On other words, this conclusion is context dependent.

Some conclusions are not context dependent but are raised in every case study. Collaboration between parties is seen as a positive tendency because is enhances mutual understanding, and herewith improves the quality and strength of applied adaptive solutions.

All case studies show the importance of information that is comprehensible and accessible for individuals. In Zaandam, the municipal foundation bureau – although until now mainly focussing on foundation problems related to a frequent occurring bacterium – has an important information gathering and communicating function. This bureau could serve as an example for establishing an information bureau on local water conditions in the future. In Delft, the creation of a municipal water coordinator is seen as a first step to establish water information bureau for residents. Also, by some it is brought up that house brokers might play a mediating role in information dissemination from the public to the private sector. In De Wijde Wormer, people did not express a need for such an information bureau, but they do emphasise the importance of information sharing between stakeholders.

Information links closely to learning capacity and the ability to act/adjust. Informing individuals about local water conditions enhances both learning and ability to act. But there is one more general obstacle identified in the current institutional context: the lack of awareness among individuals of water problems and related to this the lack of need to be aware of those problems. By many it is thought that this – at least partly – could be resolved by obligating a water section in every building-buying contract, include water aspects in the already obligatory constructional report and design a water label for buildings just like the recently introduced energy label.

7. Conclusions and recommendations with regard to the Score Card for Adaptive Capacity

Generally, we come to the conclusion that the Score Card for Adaptive Capacity provides a useful framework to analyse the adaptive capacity in practice. The different dimensions are able to capture the relevant information on adaptive capacity at the local level and structure this in such a way that germane conclusions can be drawn. However, the exercise of applying the scorecard to the case studies did reveal some points for further thought and discussion.

First, the scorecard is especially useful for providing an analytic frame of thought to map and interpret the diverse results collected through qualitative research. It could be questioned whether it is functional to assign a quantitative score on each dimension. The intention of using scores or colours is to generate an overall picture that captures the general results and herewith at a glance shows what dimension could be enhanced to increase the adaptive capacity. But applying scores can also reduce too much information. We feel that in some cases the score does not represent the general conclusion on that dimension of adaptive capacity. For example, in the case of De Wijde Wormer, the dimension of leadership has been given a neutral score: one hand collaborative leadership is very strong but this is counteracted by a lack of visionary leadership. The resulting neutral score does not show this important distinction and thus provides little practical information to people (e.g. policy makers, civil societies etc.) who want to increase the adaptive capacity. Thus, while the Score Card for Adaptive Capacity provides a useful framework to collect, analyze and interpret qualitative data on adaptive capacity, the resulting picture that displays quantitative scores on the six dimensions of adaptive capacity for a particular institutional context is powerful but has its limitations.

This relates to a second difficulty we encountered while using the scorecard, that is the fact that operationalizations of one dimension in some cases contradict. Consider again the example of leadership. What the results of our case studies show is that strong visionary leadership hampers strong collaborative leadership. This is an interesting result that is now concealed by the scorecard with the resulting neutral score. So where the Score Card for Adaptive Capacity is able to show whether different dimensions oppose each other, it is not able to show whether there are contrasting processes within one dimension. The same goes for processes or elements that reinforce each other.

Third, what are we actually assessing when we are evaluating the adaptive capacity in practice? Are we giving our own opinion on the level of adaptive capacity, or do we depict how respondents evaluate their adaptive capacity? When respondents indicate a problem with visionary leadership or a shortage of funds, do we evaluate this as negative as we did? Or are we making our own judgements about the quality of leadership and the level of funding? It is obvious that both approaches could well result in different outcomes. We therefore recommend that the chosen approach be explicated at the start of the research.

Fourth, the suggestion that the assessment of adaptive capacity is or should be context dependent, as explained in the previous chapter, is a matter that needs further elaboration. Is this a conclusion that holds up in other case study research as well?

A last point to make here concerns the usefulness of the Score Card for Adaptive Capacity as a means to structure interviews in case studies. As we explained in our methodology chapter, we started our interview series with directly asking the respondents to make an evaluation of each dimension of adaptive capacity for their situation. This ran up against some difficulties. First, explaining the scorecard took up a lot of time. Second, relating the abstract concept of adaptive capacity to the practical subject under study (i.e. division of responsibilities for local water management) proved to be confusing for many respondents. For those reasons, after the first three interviews we decided to no longer explain the scorecard but only explicate the practical research question. We did ask for their opinion on the six dimensions indirectly, by relating them to the practical research subject. This way, we were after all able to make an assessment on the criteria on the basis of the views expressed in the interviews.

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Appendix I. Interview Questions

(in Dutch)

1. Wat is uw eigen rol bij het lokale waterbeheer (het lokaal opvangen en afvoeren van regen-, grond- en afvalwater, het voorkomen van wateroverlast)?
2. Heeft u verschillende manieren voor handen om invulling te geven aan uw rol? Hoe bent u tot deze manier(en) gekomen?
3. Kunt u aangeven wat de verantwoordelijkheden van andere partijen zijn bij het lokale waterbeheer? Hebben zij volgens u verschillende manieren voor handen?
4. Is er volgens u de laatste jaren iets veranderd in de verdeling van verantwoordelijkheden tussen partijen voor het lokale waterbeheer?
5. Werkt u samen met andere partijen of personen om het lokale waterbeheer goed te regelen?
6. Heeft u, of een van de andere partijen, het handelen in het verleden wel eens aangepast omdat er problemen waren met het waterbeheer?
7. Zijn er bij u strategieën bekend, voor uzelf en voor anderen, over wat te doen in een 'crisissituatie' van extreme weersomstandigheden, bijvoorbeeld hevige regenval of een extreem droge maand?
8. Zijn er volgens u voldoende middelen (kennis, geld, tijd) beschikbaar om uw taak goed uit te voeren, en voor anderen om hun taken goed uit te voeren?
9. Heeft u het idee dat één persoon, of een partij, de leiding heeft of neemt bij het lokale waterbeheer in WijdeWormer?
10. Ervaart u de huidige verdeling in verantwoordelijkheden voor het afvoeren van water als eerlijk/rechtvaardig?
11. Afsluitende vraag over interview zelf

Appendix II. List of Interviewees

Bewonersplatform Binnenstad Noord	Ing. J. T. Gravesteijn e.a.
Bewonersplatform Krimp	Dhr. R. Klopper
Dienst Landelijk Gebied	Mw. A. Kromwijk
Eigenaren Nieuwelaan	Dhr. R. Germain
Gemeente Delft	R. van der Werf
Gemeente Wormerland	Dhr. H.A. Stuurman
Gemeente Zaanstad	Dhr. H. Grotenbreg
Gemeentelijk Adviesbureau Funderings-herstel	Mw. M.Koppe
Hoogheemraadschap Delfland, bestuurslid	Dhr. J. Wijnants
Hoogheemraadschap Hollands Noorder-kwartier	Mw. D. Groot-van Engelen
LTO-Noord	Dhr. H. Ghijsels
Provincie Noord-Holland	Mw. M. Groen
Provincie Zuid Holland	Dhr. J.J. van Tellingen
Stichting Landschap Laag Hol-land/Hoogheemraadschap Hollands Noor-derkwartier	Dhr. H. Roodzand
Stichting Platform Fundering Nederland	Ing. A. van Wensen
Stivas Noord-Holland	Dhr. W. van Egteren
Syncera	Ir. J. Spit
Willemars Makelaars	Dhr. Willemars
Woningbouwcorporatie Vestia	Dhr. J. Hulsbergen