Master Thesis

Resilience and participation in climate change adaptation

An analysis of the cities of Enschede and Zwolle

Keywords: climate change adaptation, climate resilience, stakeholder participation, risk management, public policy, public administration

Submitted in partial fulfilment of the requirements for the degree of Master of Science in Public Administration, University of Twente, The Netherlands

30-03-2019

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Preface

Before you lies the thesis 'Resilience and participation in climate change adaptation: an analysis of the cities of Enschede and Zwolle'. I conducted the research to fulfil the requirements for the Master of Public Administration at the University of Twente from November 2018 till March 2019. This thesis intends to provide opportunities and ideas regarding the implementation of risk dialogues for small(er) municipalities in the province of Overijssel. The research has created insights into the participatory activities that the cities of Enschede and Zwolle have carried out during the implementation of risk dialogues, and their experience from the application of the self-assessment tool within the context of the CATCH project.

I would like to thank a number of people. First of all, I would like to thank Gül Özerol for her excellent guidance and support during this research. This thesis would not have been the same without your constructive feedback. Secondly, I would like to thank two fellow students, Franziska Baack and Susan Groenia, for their support and the excellent cooperation both in sharing and collecting data. And thirdly, I would like to thank Kris Lulofs and everyone who contributed in the data collection for the CATCH and CATCH+ projects.

Sophie Groeneveld
March 30th, 2019

Abstract

Climate change is causing an increase in extreme weather events, such as floods, droughts and heat waves. The Netherlands is vulnerable to climate change due to the fact that 60% of its land lies beneath sea level and that it is a highly urbanized and densely populated country. Building resilience in urban areas through climate change adaptation is necessary to decrease and ideally prevent the damages that result from extreme weather events. The Delta Plan for Spatial Adaptation aims to accelerate and improve climate change adaptation in the Netherlands. Municipalities are expected to identify vulnerabilities in their area through a stress test, conduct risk dialogues with relevant stakeholders and formulate a strategy to deal with these vulnerabilities. This research focusses on the cities of Enschede and Zwolle in the province of Overijssel, since their implementation of the DPRA runs ahead of other cities in Overijssel, and as part of CATCH, a European project focusing on climate adaptation in mid-size cities, they co-developed and applied a self-assessment that shares the objective of the stress test, i.e., to identify vulnerabilities. A spin-off project originated from the CATCH project, namely CATCH+, which focusses on expanding the impact of CATCH in the province of Overijssel.

The objectives of this research are twofold. Firstly, it aims to identify the participatory mechanisms that these cities have followed for the implementation of risk dialogues. Secondly, it aims to determine the added value of the self-assessment on implementing the risk dialogues. To achieve these objectives, data was collected via a desktop study and interviews with civil servants from Enschede and Zwolle. The analysis of the collected data regarding participatory mechanisms is conducted using the framework of Dietz and Stern which focusses on five aspects, i.e., breadth, intensity, influence, openness and goals. This analysis and the analysis of the self-assessment tool has led to results that can be used by the CATCH+ project to tailor the self-assessment tool to the characteristics of the smaller cities in Overijssel, and to advise and support smaller cities. Furthermore, the results can be used by the municipalities of Enschede and Zwolle to learn from and get inspired by each other, and smaller municipalities can use the results to design the implementation of risk dialogues and the participation activities.

It can be concluded that both cities have used several participatory mechanisms. However, in the first two steps of the Delta Program on Spatial Adaptation, which are identifying the vulnerabilities and conducting a risk dialogue, they have to a lesser extent or not at all used participatory mechanisms. In both cities, the vulnerabilities are identified by using models, and the risk dialogue is in Enschede executed by the municipal council, whereas in Zwolle, currently plans are being made to conduct the risk dialogue. In Enschede, professionals did participate in developing the method of identifying vulnerabilities, and the municipality of Zwolle pays attention to involving stakeholders and connecting them to each other. Participation of the public members happens in both cities extensively at the

project level, after the vulnerabilities and the acceptable risks have already been identified. In the Stadsbeek project in Enschede, six participatory mechanisms can be distinguished and in the project Seringenstraat in Zwolle, five participatory mechanisms can be distinguished. Among the participatory mechanisms there is much variety in the five aspects that are used to analyse and describe the participatory mechanisms, i.e., breadth, intensity, influence, openness and goals.

The use of the self-assessment tool was generally experienced as difficult because of unclarity in definitions and referencing. In both cities, it has provided insights in one subject that did not receive enough attention previously. The respondents were missing indicators regarding economics and droughts. Respondents from Enschede believes that the self-assessment tool has an added value in the implementation of DPRA, but those from Zwolle disagree, as they believe that the tool did not provide them with any new insights. They do think that the tool is useful for municipalities in which climate change adaptation is a new subject and there is a need for insights into strengths and weaknesses. The contribution of the self-assessment tool to the implementation of risk dialogues can be increased by complementing the tool with the elements that are missing and the points of improvement according to practitioners and based on the comparison with related tools. These points of improvement are: 1) add an economic dimension that entails financial effects of climate extremes, 2) pay attention to exposure, 3) provide clarity regarding definitions of terms such as 'good' and 'effective', 4) describe a frame of reference for scoring, 5) increase relevance by tailoring the tool to the city, and 6) focus on other climate extremes as well, such as droughts.

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DPRA: Delta Plan Ruimtelijke Adaptatie / Delta Plan on Spatial Adaptation

GGD: Gemeentelijke Gezondheids Dienst / Municipal Health Organization

RIONED: Stichting Riolering Nederland / Sewerage Foundation of the Netherlands

RIVUS: wastewater chain partnership in western Overijssel, name is the Latin word for drainage system

STOWA: Stichting Toegepast Onderzoek Waterschappen / Foundation for Applied Research for Waterboards

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1. Introduction

Climate change is a growing and important problem, and its effects are not yet fully discovered. It is expected that if climate change continues as the past decades, by the end of the 21st century, extreme temperatures will occur ten times more often and heavy rainfalls will occur four times more often than today (Seneviratne et al., 2012, p.112-113). A change in climate will cause a change in 'the frequency, intensity, spatial extent, duration, and timing of weather and climate extremes' (Seneviratne et al., 2012, p.111). A climate extreme is a weather event that is relatively abnormal regarding temperature, precipitation or wind. The natural and physical environment changes during an extreme weather event, resulting in coastal impacts; droughts; extreme sea levels; floods; high-latitude changes including permafrost; glacier, geomorphological, and geological impacts; sand and dust storms; and heat or cold waves (Seneviratne et al., 2012).

The Netherlands is a low-lying country, of which 60% is located beneath sea-level and would be flooded for approximately 75% at high sea-levels if its coastal line would not be filled with dikes and drainage systems. It is expected that sea-levels could rise up to 130 centimetre in 2100 (Stead, 2013). Although the Netherlands has a long history of water management, several events such as floods and droughts show the hydro-meteorological vulnerability of the country (Veraart et al., 2010). Additionally, the Netherlands is a very urbanized country. Urban areas are more vulnerable to climate change risks such as floods and heat stress because the near-surface temperature in urban areas is higher than in non-urban areas and water drainage is a complicated task due to the paved environment (Semadeni-Davies et al., 2008). Therefore, urban areas need to become more resilient in order to prevent (further) damage from extreme weather events by focusing on climate change adaptation. Additionally, the vulnerability and exposure to climate change risks becomes greater due to the high population densities.

The Delta Plan on Spatial Adaptation (Deltaplan Ruimtelijke Adaptatie; hereafter "DPRA") is part of the annual delta program of the Dutch national government and describes how governmental organizations at different levels can accelerate the process of climate change adaptation. The plan consists of seven objectives, namely: identifying vulnerabilities, conducting a risk dialogue and formulating a strategy, composing an implementation agenda, utilizing linking opportunities, stimulating and facilitating, and regulating and securing (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). The DPRA follows a risk-based approach, which is promoted by the OECD (2013) and consists of three steps: 1) knowing the risk, 2) targeting the risk, and 3) managing the risk. The first step provides information on the risk-based on risk assessments and perceptions of stakeholders, this is similar to the first, and partly second ambition of the DPRA – vulnerabilities and risk dialogues. The second step 'requires facilitating stakeholders' agreement on

the acceptability and tolerability of a given risk, relying on both evidence- and value-based judgements' (OECD, 2013, p.3). This comprises the idea behind the risk dialogues in the DPRA. The last step is to clarify arrangements between governmental and nongovernmental actors and manage the risk, which is similar to step 3 to 7 from the DRPA (OECD, 2013). This research focusses on the second objective of the DPRA, i.e., conducting a risk dialogue and formulating a strategy. For the first objective, municipalities should have carried out a stress test that provides insights in the vulnerabilities and opportunities within their cities. The results of this stress test serve as input for the risk dialogue. The cities of Enschede and Zwolle have also used a self-assessment tool for the CATCH project (see section 1.2.1 for further information on CATCH). This research will identify the position of this tool in relation to the stress test, and examine its added value for the implementation of risk dialogues.

It is emphasized that the risk dialogues should be conducted with all relevant stakeholders but a clarification of how they should be conducted or what 'relevant' means is missing (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). The objective of the risk dialogue is to reach agreements on the following questions: Who will make additional efforts to mitigate the vulnerabilities as pointed out in the stress test? How can citizens and private organizations be supported in taking measures themselves? What level of damage will be accepted? Ultimately, the risk dialogues provide a certain ambition in dealing with the effects of climate change and an implementation program with measures (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). It is essential to include stakeholders in these risk dialogues. Research points out that participation can increase the effectiveness of and is essential for the development and implementation of adaptation plans (Sarzynski, 2015; Baker, et al. 2012; Hurlbert & Gupta, 2015). Public participation can be used both as a bottom-up governance approach, as well as a bridge between the risk knowledge of experts and the risk perceptions of different stakeholders, including individual citizens. Merkelsen emphasizes that 'risk perceptions of laypeople were found often to be richer and more sophisticated than those of risk experts' (Merkelsen, 2011, p.632). Public participation thus increases the effectiveness of the development and implementation of plans because it increases the legitimacy and the quality of the decision(s) and/or policy.

1.1. Research objectives

The objectives of this research are twofold. Firstly, this research aims to identify the participatory mechanisms that these cities have followed for the implementation of risk dialogues. Secondly, it aims to determine the added value of the self-assessment on implementing the risk dialogues. The results will enable the CATCH+ project to tailor the self-assessment tool to the characteristics of the smaller cities in Overijssel, and to advise and support smaller cities. Furthermore, the results can be used by the municipalities of Enschede and Zwolle to learn from and get inspired by each other, and smaller

municipalities can use the results to design the implementation of risk dialogues and the participation activities.

1.2. Research question and sub-questions

The main research question is as follows: How can the self-assessment tool be used in order to improve public participation in risk dialogues within the context of the DPRA?

This research question is exploratory in nature because it intends to explore and identify the multiple ways that the self-assessment tool can be used to improve public participation in risk dialogues. Answering the research question will help achieve the research objective to identify obstacles and opportunities in the implementation of risk dialogues because two of the elements in this implementation, that are: 1) the use of the self-assessment tool, and 2) public participation mechanisms, will be examined and recommendations will be identified for improving the self-assessment tool and the participatory mechanisms.

The sub-questions that need to be answered in order to answer the main research question are formulated as follows:

- Which participatory mechanisms have the cities of Enschede and Zwolle followed thus far to implement risk dialogues?
- How is the self-assessment tool used and experienced by civil servants of Enschede and Zwolle?
- To what extent does the self-assessment tool have an added value on the implementation of risk dialogues within the context of the DPRA?
- How can the contribution of the self-assessment tool to the implementation of risk dialogues be increased (for smaller municipalities)?

The first sub question is descriptive and consists of a description of participation activities in Enschede and Zwolle related to the implementation of risk dialogues, including the processes and methods of organizing this participation. Answering this question will provide insights in the obstacles and opportunities faced in each participatory activity. The second sub question is also descriptive in nature and consists of a description of the experiences and opinions regarding the self-assessment tool. The answer to this question will include obstacles and opportunities regarding, or positive and negative aspects of, the self-assessment tool. The third question is evaluative in nature and answering the question has provided insights in whether the added value of the self-assessment tool is low or high. The last sub question is a design question that provides a recommendation on the change of the self-assessment tool to increase its contribution in the implementation of risk dialogues.

1.3. CATCH and CATCH+

The CATCH project is a transnational project funded by the European Union Interreg North Sea Programme. It aims 'to demonstrate and accelerate the redesign of urban water management of midsize cities in the North Sea Region in order to become climate resilient cities that are sustainable, liveable and profitable on the long term' (CATCH, 2017). The University of Twente is involved in this project to integrate scientific and practical knowledge on climate resilience in decision support tools and deepen knowledge through transnational comparisons. The partners of the CATCH project co-developed a self-assessment tool that provides insights into a city's vulnerabilities and opportunities in more areas than solely the physical environment. The tool has already been used by the cities of Enschede and Zwolle. The self-assessment tool is a benchmarking tool which is 'a structured approach to comparison to facilitate learning' (Papaioannou, Rush & Bessant, 2006, p.93). A spin-off project originated from the CATCH project, namely CATCH+, which focusses on expanding the impact of CATCH in the province of Overijssel. The CATCH+ project aims to use the knowledge and tools developed within CATCH to accelerate and improve the implementation of risk dialogues within the context of the DPRA. The experiences from the cities of Enschede and Zwolle will be used to advise and support smaller municipalities in the province, who likely have less capacity to implement risk dialogues than bigger cities.

2. Literature review

2.1. Climate change

A climate extreme is a weather event that is relatively abnormal regarding temperature, precipitation and/or wind (Seneviratne et al., 2012). The natural physical environment changes during an extreme weather event, resulting in coastal impacts; droughts; extreme sea levels; floods; high-latitude changes including permafrost; glacier, geomorphological, and geological impacts; sand and dust storms; and heat or cold waves. Heatwaves, droughts and floods are the consequences of climate change that are deemed most important for the Netherlands by the DPRA. Heat waves are the result of unusually high temperature levels that occur for a longer period of time (Seneviratne et al., 2012). If there is a shortage of precipitation or groundwater storage or an increase in evapotranspiration during these periods, the heat wave can induce droughts. Opposite to this lack of water, long-lasting or intense precipitation, causes flooding, which is 'the overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas that are not normally submerged' (Seneviratne et al., 2012, p.175). These weather extremes involve risks that endanger the environment, health and safety. Especially cities are affected by climate change, since urbanization additionally influences climate, increases temperature and limits water drainage opportunities (Kalnay & Cal, 2003).

Urban areas are often blamed for climate change because of the high greenhouse gas emissions within these areas. The large population in urbanized cities accounts for most of the emissions that cause climate change and the growing population is seen as problematic for climate change (Satterthwaite, 2009). Besides getting blamed for the problem, urbanized areas are also most impacted by climate change. Urbanization increase climate change risks such as heat stress and flooding because the near-surface temperature in urban areas is higher and water drainage is more complicated by the paved environment (Semadeni-Davies et al, 2008). Additionally, the vulnerability to climate change risks increases due to the large number of people and assets in cities being exposed to extreme events.

2.1.1. Risk reduction and climate resilience

Risk reduction is necessary to ensure health and safety and protect the environment. Tabari and Willems (2018) define a risk as a combination of a hazard, vulnerability and exposure. A hazard refers to 'the possible, future occurrence of natural or human-induced physical events that may have adverse effects on vulnerable and exposed elements' (Cardona et al., 2018, p.66). Exposure refers to 'the inventory of elements in an area in which hazard events may occur' (Cardona et al., 2018, p.66). The population of a municipality that faces these hazards will always be exposed to the hazard.

Vulnerability refers to 'the propensity of exposed elements such as human beings, their livelihoods, and assets to suffer adverse effects when impacted by hazard events' (Cardona et al., 2018, p.67)

Risk reduction can thus aim at (a combination of) mitigating the hazard, limiting exposure or decreasing vulnerability. This can be done by building resilience through a combination of adaptation and mitigation measures. Mitigation measures focus on the actual hazard, while adaptation measures focus on vulnerability and exposure (Stead, 2013). The broad term of resilience entails being able to 'tolerate disturbances through characteristics or measures that limit their impacts, by reducing or counteracting damage and disruption, and allow the system to respond, recover, and adapt quickly to such disturbances' (Wardekker, 2010, p.988). Climate resilience would thus entail being able to tolerate disturbances that are caused by climate change, such as floods and droughts. Resilience shifts the focus on climate change from crises and shocks to 'a context of on-going change, characterised by greater uncertainty and risk' (Friend & Moench, 2015). Stead (2013) points out the importance of spatial configuration and the use and development of land and their 'significant implications for both adaptation to the adverse impacts of climate change and the reduction of emissions that are causing the change' (p.18). Since it is impossible for municipalities to mitigate the hazards of climate change, the focus should be on adaptation strategies (Tol, 2005).

2.1.2. Local climate change adaptation

The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as the 'adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities' (IPCC, 2014, p.1758).

Attention for climate change has shifted from (inter)national policy to the local level with a focus on the causes and impacts at this level (Baker, Peterson, Bron & McAlpine, 2012). Coherently, responsibility shifted to local government as well and they are tasked with the adaptation to climate change. Due to their responsibility for management and planning at the local level, the local governments have a leading role in addressing adaptation, but they are not the only actors that need to respond to climate change through adaptation (Pasquini, Ziervogel, Cowling & Shearing, 2015). Other actors, from governmental, NGOs and private organizations to households and communities should also adapt to climate change. It is thus necessary for local governments to take climate change adaptation into account internally, and they should also promote this externally.

Research on local climate adaptation pointed out that implementing effective policies is at risk because it 'may be beyond the capacity of many local government, with the most commonly reported barriers being lack of information, local expertise, financial resources, and political support' (Baker, et al., 2012, p.128). Other problems regarding the effective implementation of climate adaptation strategies are 'the lack of clear roles and responsibilities for local government, an absence of statutory

obligations and constraints on local governments manifesting from the interplay between policies and regulations within broader governance frameworks' (Baker, et al., 2012, p.128). Baker et al. (2012) provide three recommendations that can improve adaptation policies at the local level. Firstly, they emphasize that on-going financial support is needed in order for municipalities to collect the necessary information about and create plans for the effects of climate change. Secondly, higher government levels should provide municipalities with requirements and standards for adaptation (Baker, et al., 2012). And third, it is essential that the *public participates* in developing adaptation plans.

2.2. Risk dialogue

The term dialogue has been conceptualized in many different ways, such as ordinary conversation, 'an everyday, pervasive aspect of language use and interaction' (Barge & Martin, 2006), or a situation in which differences are represented (Ganesh & Zoller, 2012). A dialogue is opposite to monologue, suggesting an interactive process between more than one actor. As there is no scientific literature on risk dialogues between governments and stakeholders in the context of climate change adaptation, the following information is from broader literature on risk dialogues.

Previous research shows that dialogues created energy, and helped involved actors to understand one another and overcome disagreement. Addressing the importance of dialogue in risk communication, Sellnow and Sellnow (2010) point out that a risk dialogue provides opportunities since those who normally only bear the risk are given a voice to determine the tolerated level of risk. Thus, instead of informing about a risk (monologue), the conversation is focused on determining the accepted level through interactive communication (dialogue). In a study by Pronk et al. (2004), the dialogue session consisted of 'listening, hearing, and synthesizing the variety of viewpoints, perspectives, and opinions about the importance, challenges, and opportunities' (p.5).

According to Sellnow and Sellnow (2010), credibility, trust, self-efficacy and access need to be present to achieve a sufficient level of dialogue. From a stakeholder point of view, the provided information must be seen as credible which depends on aspects such as trustworthiness, accuracy and completeness. Trustworthiness is a determining factor in labelling information as credible or not, but trust in general – that is trusting an organization or person to be genuine and fair, is also conditional for achieve meaningful dialogues, the same applies to self-efficacy – being able to carry out the behaviour necessary to produce desired results, and meaningful access– that is having the opportunity for interaction as well as being able to acquire the necessary information (Sellnow, Ulmer, Seeger, & Littlefield, 2009).

2.3. Public participation

The term participation knows many synonyms such as citizen participation, stakeholder engagement, and public participation. Public participation refers to the act of including actors to a stage or multiple stages of policy or decision making for different rationales. Three rationales of participation can be distinguished, that are: 1) instrumental, 2) substantive, and 3) normative (Wesselink, et al., 2011). The aim for instrumental use of public participation is to increase the legitimacy of and improve decisions by restoring credibility, creating justifiability and ownership. Substantive public participation focusses on increasing the quality of decisions by collecting information from the (nonexpert) public and normative public participation aims to include the public based on their democratic rights and values (Wesselink, et al., 2011).

Different types of public participation exist. In the Water Framework Directive (2002), the EU distinguishes three types of participation, namely: information supply, consultation and active involvement. Defining two of these levels, that are information supply and consultation, as public participation is not supported by other literature. Few, Brown and Thomkins (2007) point out that these are forms of inclusion but do not change the relations between the decision-making body and the public and thus do not contribute to weakening top-down decision-making which is, according to them, a crucial goal of public participation. Active involvement is thus an important aspect of public participation.

Many arguments exist for enabling participation because it can increase the effectiveness, quality and legitimacy of a policy (Dietz & Stern, 2008; Baker et al., 2012; Sarzynski, 2015; Hurlbert & Gupta, 2015). Merkelsen emphasizes that 'risk perceptions of laypeople were found often to be richer and more sophisticated than those of risk experts' (Merkelsen, 2011, p.632). Having two different perceptions allows for a broader view on the problem which likely increases the quality. Participation can also be seen as a form of democracy and then used as a mechanism to gain acceptance from the public. Overall consent from the public increases the legitimacy of a policy (Dietz & Stern, 2008). There also exists critique on participation, namely that: 'the costs are not justified by the benefits, the public is ill-equipped to deal with the complex nature of analyses that are needed for good environmental assessments and decisions, and that participation processes seldom achieve equity in process and outcome' (Dietz & Stern, 2008, p.33).

2.3.1. Identifying and engaging stakeholders

Stakeholder analysis consists of the collection and analysis of data on stakeholders to develop an understanding of decision-making and evaluate the relevance of a stakeholder to a policy or decision-making process (Brugha & Varvasosvszky, 2000). Pomeroy and Douvere (2008) define stakeholder

analysis as 'an approach and procedure for gaining understanding of a system by means of identifying the key actors and stakeholders in the system and assessing their respective interests in that system' (p.818). This stakeholder analysis can thus be used to determine what stakeholders should be involved in the decision or policy making process. The analysis usually consists of describing information about the present, past and future of the stakeholder, including their characteristics, interests, relations and network, position, and influence (Brugha & Varvasosvszky, 2000).

The first step in a stakeholder analysis is to identify the stakeholders (Brugha & Varvasosvszky, 2000). This can be done by thinking logically or for example using surveys among known stakeholders and asking their opinion about other relevant stakeholders. The second step is stakeholder mapping or stakeholder assessment to identify the relationships between stakeholders and the strength of these relations. The last step is the diagnosis of stakeholders, in which an assessment is made to identify potential threats and opportunities for cooperation (Brugha & Varvasosvszky, 2000). Based on this information, one can formulate a strategy for managing the stakeholders.

Once the relevant stakeholders are identified and an arena is created that is accessible to the stakeholders (Healey, 1996), it is necessary to engage them to participate in the decision or policy making process. Foster and Jonker (2005) state that action-oriented communication is essential in developing stakeholder relationships followed by the opportunity to act on this communication. Creating the opportunity to act on this communication can be done by implementing stakeholder engagement methods. Several factors that are collected through the stakeholder analysis can be used to determine the method, such as norms, knowledge, timing within the project, level of involvement and characteristics of the stakeholder (Luyet, Schlaepfer, Parlange & Buttler, 2012). Examples of engagement methods that aim at collaboration (and thus active participation) include interviews, focus or working groups, meetings, citizens' juries, conferences, forums, workshops, symposia, role playing, multicriteria analysis and scenario analysis (Luyet, Schlaepfer, Parlange & Buttler, 2012).

Much literature on stakeholder participation focuses on definitions, forms of participation and processes during participation, but little research can be found on the motivations of stakeholders to engage in participation in the first place. Research by Mulema and Mazur (2015) on motivations of stakeholders in innovation platforms emphasizes that for stakeholders to engage, there must be some kind of benefit for them to participate. These benefits can be developmental, material, economic or social in nature, or promoted by incentives. The factors that restrict stakeholders from participating are 'unrealistic expectations, lack of sufficient knowledge, lack of resources, and over-commitment' (Mulema & Mazur, 2015, p.14). Research on promoting stakeholder participation in Germany provided two aspects that can be designated as success factors: incrementalism and bridging (Lange, Siebert & Barkmann, 2016). The incremental process of promoting participation created trust between stakeholders, which eventually caused an accountable and transparent ambiance. Participatory

instruments such as information provision and focus groups with feedback possibilities were step-by-step implemented and eventually resulted in a forum for active participation (Lange, Siebert & Barkmann, 2016). The second success factor was the creation of a bridging element between stakeholders and the organization, a point of contact in order to promote accessibility.

2.3.2. Public participation in climate change adaptation

Sarzynski (2015) states that participation will increase the effectiveness of adaptation plans because it is a bridge for the gap between bottom-up and top-down approaches to adaptation. Besides its function as a bridge in governance structure, public participation, and especially citizen participation serves as a bridge between knowledge of experts and the risk perceptions of the public (Merkelsen, 2011). He points out that the citizens perception on a risk is 'often richer and more sophisticated than those of the risk experts' (Merkelsen, 2011, p.632). According to Wamsler (2017), to establish and implement adaptation strategies, it is necessary to involve different stakeholders and provide them with the possibility to contribute to the process.

To assess public participation, Hurlbert and Gupta (2015) developed a split ladder of participation. This tool, which is based on factors of uncertainty, values and trust, determines when and under what conditions participation is necessary and likely to succeed. It consists of four types of problems or quadrants that are categorized by the level of disagreement on science and values/norms. Problems related to climate change and climate adaptation fit, according to Hurlbert and Gupta (2015), the fourth quadrant – that is unstructured problems with high level of disagreement on both science and values/norms. The split ladder states that the fourth quadrant is 'the ideal place to expand public participation' (Hurlbert & Gupta, 2015, p.108). An unstructured problem requires 'triple loop learning through high participation, dialogue, trust building and discourse by exposing context, power dynamics and underlying values' (Hurlbert & Gupta, 2015, p.105). Triple loop learning, the attempt to structure unstructured problems, is the analysis to understand the relation between problems and solutions so that 'learning goes beyond insight to context, leading to transformational learning' (Hurlbert & Gupta, 2015, p.103). However, their case study points out that problems related to climate change may never degrade to a lower quadrant due to the difficulty of achieving triple loop learning.

2.4. Framework for analysing public participation in climate change adaptation

Fung (2006) classifies three dimensions that determine variety in participation, namely the selection of participants (inclusiveness), communication forms (intensity) and power (authority). Dietz and Stern (2008) further elaborated these dimensions and point out five underlying elements of the structure of participation, namely breadth, openness, intensity, influence, and goals (p.116). Sarzynski (2015) used

the dimensions of Dietz and Stern to create a framework for analysing public participation. This framework is used in this research to analyse the public participation in climate change adaptation. Figure 1 visualises the elements of the framework, which are further elaborated below.

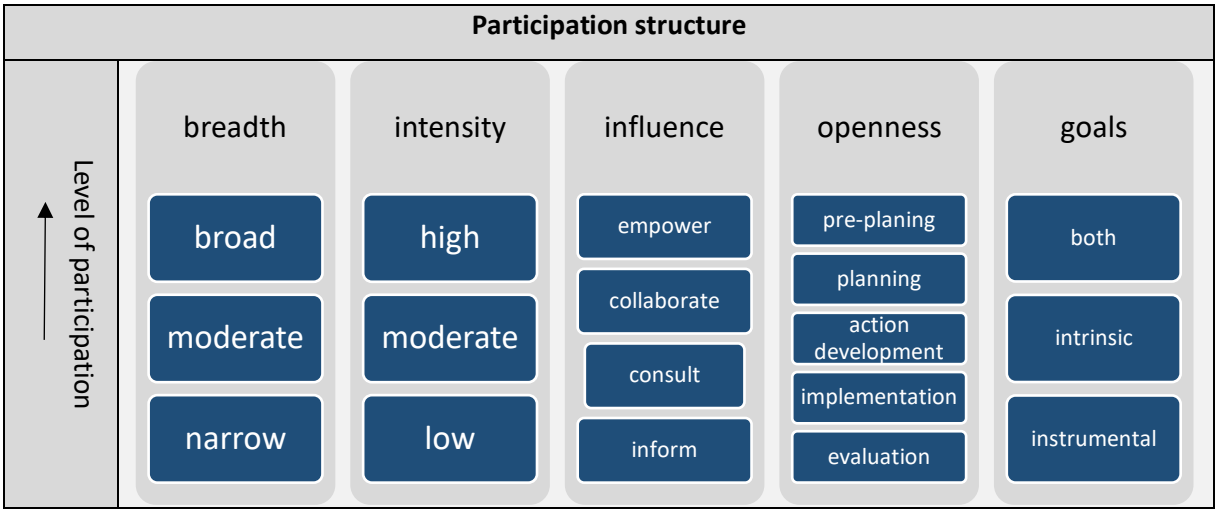


Figure 1: Analytical framework of public participation in climate change adaptation

2.4.1.1. Breadth

When stakeholder involvement is used to achieve transformative adaptation, it is necessary to involve both internal as well as external stakeholders (Wamsler, 2017). Dietz and Stern argue that public participation is more successful if it includes directly involved or affected stakeholders but also anyone who is interested should be able to participate. However, Few, Brown and Thomkins (2007) emphasize that involving a broad spectrum of relevant stakeholders in the decision or policy making process makes it harder to reach consensus. In literature on public participation there is no solid agreement on the definition of 'public'. Özerol and Newig (2008) state that public refers to any stakeholder with concern to the issue at stake. Wesselink, Paavola, Fritsch and Renn (2011) define stakeholders as 'nonstate actors, as members of the public or as organized stakeholders' (p.2688). They distinguish inclusion based on the rationale for participation. For the instrumental rationale, only 'those who have blocking power and those who are needed for implementation' (Wesselink, et al., 2011, p.2691) are included in participation. Those who possess additional knowledge are involved in substantive participation, and everyone who has a stake is included in normative participation. Sarzynski (2015) defines the public (or stakeholders) as anyone who wants to participate who is not directly linked to the decision-making, this can be citizens, the public-sector, the private sector or non-profit sector. In the framework for analysing public participation, breadth entails who participates and can be scored as narrow (if only decision-makers and advisors are included), moderate (if directly-affected public is included) or broad (if anyone who is interested is included) (Dietz and Stern, 2008).

2.4.1.2. Openness

The traditional policy making knows five stages at which participation can happen: pre-planning, planning, action development, implementation, and evaluation (Dietz & Stern, 2008). Research points out that public participation will likely be most successful when relevant stakeholders are involved as early as possible (Özerol & Newig, 2008). This is supported by Few, Brown and Thomkins (2007) whom state that it is crucial to include the appropriate stakeholders from the start of the process. Effort should be invested in searching for and determining which stakeholders should be included. Additionally, Wamsler (2017) states that stakeholder should be included 'during the entire process of developing adaptation strategies: its set-up, the assessment of local knowledge and risk context, the identification and selection of adaptation options, and so on' (p.155). In the framework of Dietz and Stern (2008) openness thus entails when participation happens and the scores for this aspect refer to the timing in the policy-making phase.

2.4.1.3. Influence

What happens in participation depends, according to Sarzynski (2015) on the influence of stakeholders in the process. Few, Brown and Thomkins (2007) state that stakeholders should have the opportunity to 'construct, discuss and promote alternative options' (p.56), and proactive deliberation must be facilitated through forums 'for sharing information, perceptions and concerns that encourage each participant to express their views and to explore alternative avenues of response' (p.57). A traditional form of participation with the least influence is voting. Intensive collaboration, in which stakeholders provide policy recommendations, has the most influence. The level of influence in the participation structure can be scored as informing, consulting, collaborating or empowering (Sarzynski, 2015).

2.4.1.4. Intensity

Intensity is determined by the time invested in participation, for example the number of interactions and the time invested in the process. Although intensity is associated with reaching desired results, Dietz and Stern (2008) emphasize that intensity is also associated with mistrust. A participation process in which there is less trust between participants and the government requires more time and meetings. Additionally, intensity is partly influenced by the breadth of participation, since a broad range of involved stakeholders makes intense participation more difficult to reach. This is supported by Few, Brown and Thomkins (2007) who state that relatively small groups will more likely have active participation. Intensity is thus determined by the time invested, but special attention should be paid to the influence of the level of mutual trust and the number of participants on this variable.

2.4.1.5. Goals

The last aspect of participation structure is the goal of the public participation process. The goal to organise participation can vary and depends on the purpose of participation and its attributed value. The goal of participation can either be intrinsic, that is 'as a means of democratic expression and procedural justice' or instrumental, that is 'for what it brings, such as knowledge, resources or acceptability' (Sarzynski, 2015, p.55). An example of an intrinsic goal is seeking consensus on a solution or decision and an example for an instrumental goal is to identify a problem. A tendency exists between involving society and efficiency – that is an effective state capable of delivering public services.

3. Methodology

3.1. Strategy and design

This qualitative research comprises two cases, the cities of Enschede and Zwolle. Scientific literature has provided insights in the importance of participation in climate change adaptation and investigating these two cases allows to gain insights in opportunities for improvement and acceleration of the implementation of risk dialogues for the DPRA with a focus on public participation. The research is partly descriptive and partly evaluative in nature. The descriptive part of this research supplements these insights with possibilities for participation in risk dialogues. This participation can be stakeholder participation, but is mostly participation from lay members in the public. Therefore, the first part consists of a description of participation activities in Enschede and Zwolle related to the implementation of risk dialogues, including the processes and methods of organizing this participation. Since in both cities public participation was organized at the project level, a description of one project in each city, including participation in those projects is provided. Enschede and Zwolle were involved in the development of the self-assessment tool and thus have used the tool already. The second part of this research examines the added value of this tool on the implementation of risk dialogues by focussing on practitioners use of and experience with the tool, the self-assessments' resemblance to other related tools from scientific literature, requirements for risk dialogues according to the DPRA and the stress test developed for DPRA.

3.1.1. Research boundaries

Due to the limited time available for this research, the focus of this research was on the following:

- the first two steps of DPRA, that is identifying vulnerabilities and conducting risk dialogues and formulating a strategy
- review of documents on participatory mechanisms followed by the municipalities of Enschede and Zwolle for implementing risk dialogues
- interviews with three civil servants in Enschede and three civil servants in Zwolle on the CATCH self-assessment tool and on participatory mechanisms for risk dialogues

3.1.2. Case selection and research unit

The research units in this study are the municipalities of Enschede and Zwolle. The setting is the implementation of DPRA thus far, that is from the moment the DPRA is presented to the municipalities in September 2017th until February 2019th. These municipalities were selected as the two cases, since they are partner cities in the CATCH and CATCH+ projects and they have contributed to the development of the self-assessment tool. In the first half of 2018, they applied this self-assessment

tool to their cities. This research examines the added value of this self-assessment tool and describe the use of participation in risk dialogues in both cities.

3.2. Data types and sources

Three types of data have been collected for this research. The first type of data is regarding the policies on climate change adaptation, which has been collected from documents, such as the National Adaptation Strategy (NAS), DPRA and local DPRA implementation in Enschede and Zwolle. This data has been used to determine what comprises the implementation of risk dialogues nationally and locally, and the extent of participation in these dialogues; it was thus mainly a desktop study. The DPRA documentation was available on the internet and thus easy to obtain, additional documents on the organisation of risk dialogues were also available on the internet. Many local implementation policies were, although not expected, also available on the internet. Additional documents were retrieved via the civil servants of the municipalities, and missing data was retrieved through the interviews with civil servants. In order to be as little as a burden as possible for these civil servants, the interviews were done in cooperation with two other students (one BSc and one PhD) that also needed to interview the same persons within the scope of the CATCH+ project. By combining the questions and creating one interview guide, we prevented recurrence.

The second type of data includes information on participation mechanisms that are followed in Enschede and Zwolle and how they experienced and used the self-assessment tool. This data has been retrieved via published local policies, internal policy documents, internal documentation from CATCH and interviews with three civil servants from each municipality. Per municipality, two civil servants were interviewed, who were involved in applying and developing the self-assessment tool for CATCH and climate change adaptation in general. Additionally, a civil servant from both municipalities was interviewed, who was involved in a climate change adaptation project. In Enschede this was for the project Stadsbeek and in Zwolle for the project Seringenstraat. Originally, there were plans to retrieve data through participant observation during a workshop that was supposed to be organised by the CATCH+ team before the end of 2018. This workshop took place, in a smaller form at the end of January 2019, but no data was retrieved since the topic on using the self-assessment tool for implementing risk dialogues was not discussed extensively. This has not caused any problems because this information was planned to be an additional source of information. All necessary data was retrieved via policy documents and interviews.

A third type of data involves scientific literature on several subjects, such as public participation, self-assessment tools and risk dialogues related to climate change adaptation in Dutch cities. This data was available online and had already been partly collected for the research proposal.

An extensive literature review has been conducted during the research, before the interviews to serve as input, and afterwards to examine the completeness of the self-assessment tool.

3.3. Data collection methods

3.3.1. Desktop study

Much of the data used for this research was obtained through desk research. For some of the data collection, it was necessary to conduct interviews because this data was not fully available or clear in policy plans and other relevant documents. However, much data was already available. Part of this data includes municipal policy plans that the municipality is obliged to make or has voluntarily made publicly available or public communication from the municipality which is logically also publicly available. Another part includes data that is not publicly available but provided through the CATCH project. For example, documents related to CATCH or CATCH+ in general, the development of the self-assessment tool, interim evaluations of the self-assessment tool, and previously conducted interviews with policymakers in Enschede and Zwolle. Additionally, the DPRA and related documents are used, which are also publicly available.

3.3.2. Semi-structured interviews

Interviews have been conducted to collect data about the participation methods and the use of and experience with the self-assessment tool. Sufficient empirical data was collected through a desktop study, which allowed for a smaller number of interviews. A total of four interviews have been conducted with a total of six civil servants, three from each municipality. The interviews were semi-structured so that the interviewee had enough room to provide input while staying close to the pre-determined subjects. Before starting the interviews, an interview guide was created in cooperation with two fellow students which included the subjects that needed to be discussed in the interviews. This interview guide can be found in Appendix 1. Additionally, to conduct the semi-structured interviews in a systematic and correct manner, thought was given to ethics. This is elaborated in the consent form, which can be found in Appendix 2, and information sheet, which can be found in Appendix 3, that the interviewees received. Attention was given to a proper introduction of the interviewer(s) because that would provide an environment in which ‘elicit reflection and truthful comments from the interviewee’ (Rabionet, 2011. p.564) can be expected. The interviewees were informed beforehand about the withdraw options and the use and scope of the results. They were also provided with the choice on how their information should be referred to. The first interview was evaluated to determine whether the interview design and interview guide had to be adjusted for the following interviews. This was not the case, and therefore the same guide was used for all the

interviews. Every interview was recorded, and a transcript was made so that responses were saved correctly, and it would be possible to retrieve all the interview data whenever needed. An overview of the interviewees is provided in Table 1.

Name	Date	Function	Organisation	Interviewers
Belshof, R.	6th February 2019	Project staff member	Enschede	F. Baack
Postma, R.	8th January 2019	Policy advisor	Zwolle	F. Baack and S. Groenia
Teekens, H.J.	10th December 2018	Water designer	Enschede	F. Baack, S. Groeneveld and S. Groenia
Vrouwe, A.	8th January 2019	Water advisor	Zwolle	F. Baack and S. Groenia
Wagelaar, K.	10th December 2018	Policy advisor	Enschede	F. Baack, S. Groeneveld and S. Groenia
Wiegman-Steen, A.	22nd January 2019	Policy advisor	Zwolle	S. Groenia

Table 1: Interviewees

3.4. Data analysis

In order to answer the main research question, it was necessary to answer the four sub-questions. Answers to these sub-questions were given through the analysis of the collected data. Table 1, on the following page, provides an overview for each sub-question on the information that was required to answer the sub-question in the form of questions, the method of analysis and the data source. This table was adapted during the research.

Necessary info	Method	Data source
What participatory mechanisms have the cities of Enschede and Zwolle followed thus far to implement risk dialogues?		
What activities are organized?	Description of content	Local implementation policies and interviews with civil servants
How are these activities organized?	Description of process	
Who organizes these activities?	Description of process	
What are the goals/objectives?	Description of aim	
What are the (expected) outcomes?	Description of outcome	
Are and if yes, how are outputs used?	Description of process	
Who participates in these activities and why?	Description of process	
How much influence do participants have?	Description of content	
How were the mechanisms chosen?	Description of process	
Who decided on what mechanisms are used?	Description of process	
How is the self-assessment tool used and experienced by civil servants of Enschede and Zwolle?		
How is the SAT used?	Description of process	Interviews and local policies
Who used the SAT and why them?	Description of process	
Are any dimensions missing?	Evaluation of content	
How difficult was it to use the SAT?	Evaluation of process	
What is positive about the SAT?	Evaluation of content	
What is negative about the SAT?	Evaluation of content	
How is the output of the SAT used?	Evaluation of outcome	
To what extent does the self-assessment tool have an added value on the implementation of risk dialogues for the Delta Program on Spatial Adaptation?		
What input is required for risk dialogues according to DPRA?	Description	DPRA
What is assessed with the SAT?	Description	SAT
What is assessed with the stress test?	Description	DPR
What self-assessment tools are provided by scientific literature?	Description	Scientific literature
What aspects of the SAT overlap with related tools?	Comparison	SAT and scientific literature
What aspects of the SAT do not overlap with the related tools?	Comparison	
How can the contribution of the self-assessment tool to the implementation of risk dialogues be increased?		
What are points of improvement according to practitioners and scientific literature?	Evaluative	Previously described data
What missing elements can be added to the tool based on the comparison of tools and practitioners' input?	Summative	

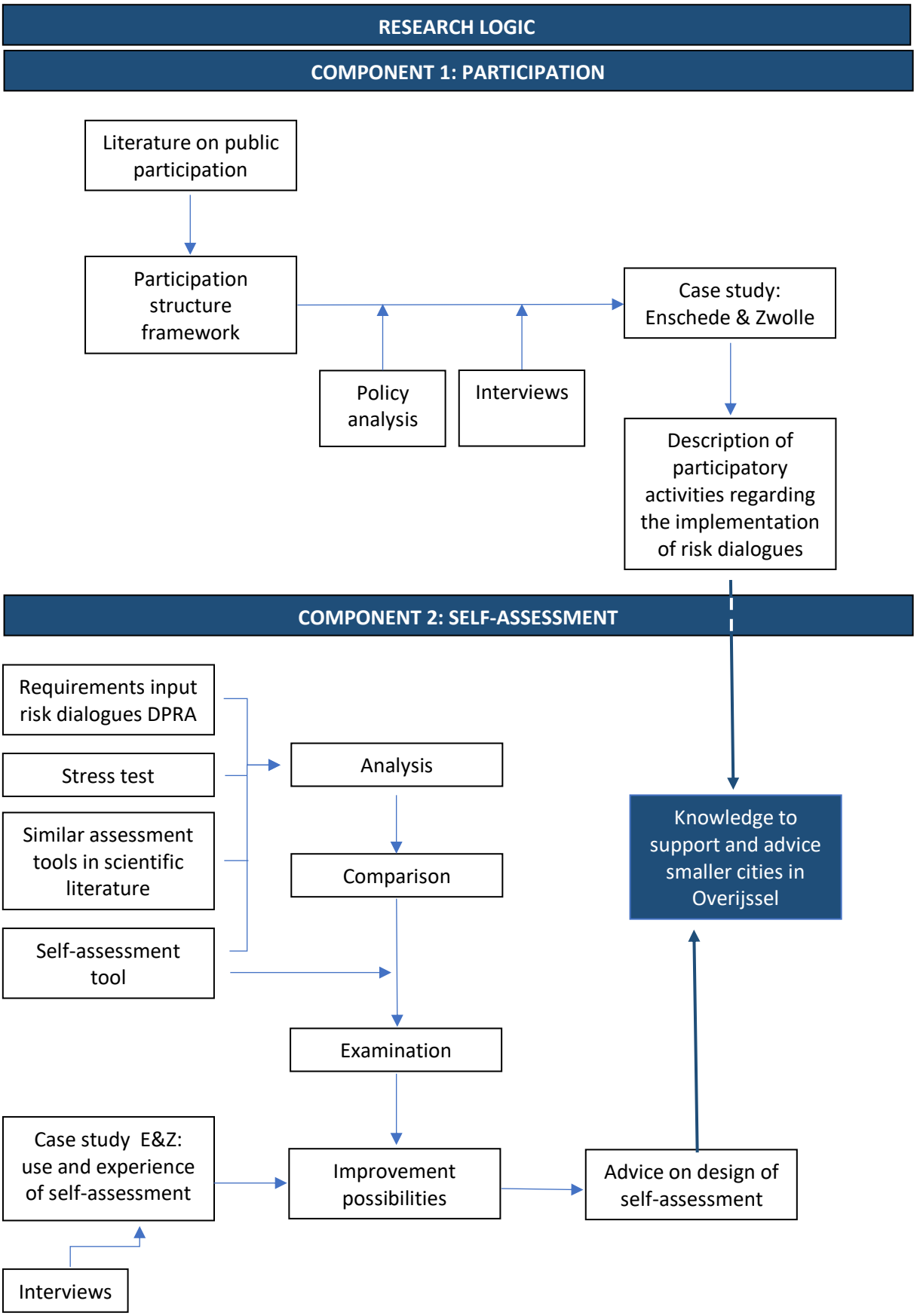
Table 2: Overview data collection, analysis and sources

3.4.1. Description of analysis per sub-question

The first sub question is descriptive and consists of a description of participation activities in Enschede and Zwolle related to the implementation of risk dialogues, including the processes and methods of organizing this participation. During the research, it was discovered that both cities involve professional stakeholders at the strategic policy making level and that citizens participate at the

executive project level. Therefore, this sub-question contains on the one hand a description of the cities' strategy including participation in the development and implementation of this strategy, and on the other hand a description of citizen participation at the project level. Each participation activity is elaborated, applying the five aspects of public participation, i.e., breadth, intensity, influence, openness and goals. The second sub question is also descriptive in nature and consists of a description of the use of and experience with the self-assessment tool that is based on the opinions and experiences of civil servants from Enschede and Zwolle. The description includes information on the process, the content and the outcome of the tool and experiences with the tool. The third question is evaluative in nature and answering the question has provided insights in whether the added value of the self-assessment tool is low or high. The last sub question is a design question that provides recommendations regarding the design of the self-assessment in order to increase the extent to which the tool can contribute to implementing risk dialogues. This design question is answered using information that is already discussed in this research.

3.5. Research logic



4. Assessing climate change resilience and vulnerability in practice

4.1. Stress test

The implementation of the first ambition of the DPRA, i.e., the identification of vulnerabilities, should be done by every municipality, waterboard, province and also the national government through a stress test (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). The stress test is intended to explore the vulnerabilities of an area and to determine possible measures. The outcome of the stress test should be used as input for the risk dialogue. Governmental organisations must cooperate with each other and make use of available expertise among each other, but they should also collaborate with anyone involved in their area (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). The national government has developed a standardized stress test, the 'stress test light', which covers a number of scenarios related to the four main risks of climate change, i.e., water nuisance, heat stress, droughts and floods. The stress test light is an explorative vulnerability scan, which should be followed up by an in-depth analysis of the areas, where it is deemed necessary to map vulnerabilities in more detail. This in-depth analysis is the regular stress test (Egging et al., 2018). The difference between both tests, is that the regular stress test is a more comprehensive, dynamic and detailed display of vulnerabilities that requires expertise from the users, whereas the light version provides a less detailed overview of vulnerable areas and is easier to conduct.

The stress test light is intended to increase the awareness of the effects of climate change and provides a general overview of the vulnerabilities of an area (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). The test is based on static maps, and the guideline for the stress test light states that the analysis for the stress test must be based on the Climate Impact Atlas. The Climate Impact Atlas provides images of the possible impact of the effects of climate change. The Climate Impact Atlas shows, for example, the areas in a city that are flooded when x millilitre of rain falls within x hours. The stress test light consists of two steps: 1) several questions must be answered for every climate change risk which results in a map that provides insights in possible vulnerabilities, and 2) this map should be discussed with every relevant department within the municipality and relevant governmental organisations such as the Waterboard, Municipal Health Organisation and Safety Region (Egging et al., 2018). With these two steps, a general overview can be created of the vulnerabilities in a city. The questions for the first step, as listed in Table 3 on the following page, must be answered for the current situation as well as the future situation – that is 2050 (Egging et al., 2018).

Water nuisance
1. What does climate change mean for the precipitation pattern?
2. Where does water go after heavy rainfall?
3. In which areas are buildings at risk as a result of flooding?
4. Where does nuisance caused by groundwater rise increase?
5. Where do agricultural and nature areas run the risk of erosion?
Heat stress
1. How many tropical days occur per year?
2. How often does heat stress occur because of warm nights?
3. How does heat influence surface water?
Droughts
1. What is the precipitation deficit?
2. What effect does drought have on the groundwater level?
3. What are the indirect effects of droughts?
Floods
1. How big is the probability of flooding for a specific area?
2. How high will the water level be during a flood?
3. What economic damage can result from a flood?
4. How high is the chance of death during a flood?

Table 3: Questions for the stress test light

4.2. Risk dialogues

The DPRA states that every municipality, waterboard, province and Rijkswaterstaat should have a dialogue with all relevant stakeholders. This risk dialogue is described in the DPRA as a means to collectively create measures and solutions regarding climate change adaptation. The only hard condition for the term risk dialogue can be found in research done in name of the Ministry of Infrastructure and Water Management. In this research, it is stated that the term risk dialogue is used when the following characteristics are met: 1) a discussion with all relevant stakeholders at a specific scale level; 2) on the basis of information about the effects of climate change; 3) to jointly formulate ambitions for spatial adaptation; and 4) with the aim that all involved stakeholders work together to realize the stated ambitions (De Graaff, Kloosterman & Moens, 2018). In the risk dialogue, the following questions should be discussed:

- Are the identified vulnerabilities correct?

- What opportunities does climate change offer? Which problems or future problems do we want to solve?
- On what scale (local or regional) are solutions available? What linking opportunities are available?
- Is there a need for additional research or knowledge? And who will implement which measures?

The DPRA emphasizes that the risk dialogue is an iterative process to create a joint agenda (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). The aim of the risk dialogue is twofold: Firstly, to increase the awareness on the vulnerabilities that arise because of climate extremes, and secondly to discuss how this vulnerability can be reduced with concrete measures. Data is required in order to be able to come up with good solutions and measures. The DPRA does not provide a clear description of what data is necessary, but it can be assumed that enough data should be used regarding risks and effects of climate extremes. This type of data can be retrieved by, for example, stress tests, interviews and 3D models (De Graaff, Kloosterman & Moens, 2018). The stakeholders that should be involved differs, depending on the subject of the climate challenge. The DPRA has identified several possible stakeholders, as listed in Table 4 (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017).

List of possible stakeholders	
- Municipality (political as well as administrative departments) - Health services (GGD) - Emergency services (police, fire department, ambulance) - Waterboard - Province - Knowledge parties such as consultants, engineering firms, architects, urban planners, knowledge institutes	- Drinking water company - Housing corporations - Utilities (electricity, gas, telecom and water) - Real estate companies - NGO's such as civil platforms, associations and interest groups - Businesses (green, construction, real estate, local industry, banks and insurance companies)

Table 4: Possible stakeholders risk dialogue

4.3. Resilience and vulnerability assessment

Assessing resilience or vulnerability in cities is essential to gain insights into strengths and weaknesses of a city and opportunities for climate change adaptation. Many tools, indexes and other methods exist to provide these insights. Although resilience and vulnerability are interrelated, it is important to note the difference between the two concepts. Vulnerability refers to 'the propensity of exposed elements such as human beings, their livelihoods, and assets to suffer adverse effects when impacted by hazard

events' (Cardona et al., 2018, p.67). Resilience entails being able to 'tolerate disturbances through characteristics or measures that limit their impacts, by reducing or counteracting damage and disruption, and allow the system to respond, recover, and adapt quickly to such disturbances' (Wardekker, 2010, p.988). Both concepts provide insights in a city's strengths, weaknesses and improvement opportunities.

In this chapter, several vulnerability or resilience assessments and frameworks are analysed. Analysing these methods provides insights in the aspects that should be included in vulnerability or resilience assessment. The first three paragraphs contain actual measurement tools, namely the Climate Disaster Resilience Index (CDRI), the Coastal City Flood Vulnerability Index (CCFVI), and the Multi-Dimensional Urban Vulnerability Assessment (MDUVA). The last two paragraphs contain frameworks for creating such a measurement too, namely the Disaster Resilience of Place model (DROP) and the Method for the Improvement of Vulnerability Assessment in Europe (MOVE). These methods are selected based on their popularity – that is, the number of times cited – in the scientific literature database SCOPUS, taking into account not to select similar tools. I chose this selection method because the goal of this chapter is to gain insights in the structure and content of assessment methods, and methods that are often cited can be expected to be appreciated and of good quality.

4.3.1. Climate Disaster Resilience Index (CDRI)

The Climate Disaster Resilience Index is part of the Climate Disaster Resilience Initiative which aims at increasing sustainable development through increasing climate resilience in cities (Prashar, Shaw & Takeuchi, 2012). This index is included in this research because it appears to be a very straightforward and quick method to assess vulnerability which suggests that it is not burdensome to use, also for non-academics. The index helps to understand the current resilience level of a city and can thus only be used for the city-level. The outcomes of the index 'are not absolute values but can serve as policy guidance' (p.1615) and the quality depends on the respondents and their knowledge. In the research of Prashar et al. (2012), the city was divided in nine districts and the index was used by local civil servants responsible for disaster management in their own district. It is not known what the civil servants based their answers on. The results of the index were compared to get insights in the required levels of attention for each part of the city and eventually the distribution of resources.

Five dimensions are included in CDRI, that are: natural, physical, economic, social and institutional (Prashar et al., 2012). Each variable consists of five parameters, figure 2 shows the parameters for every dimension (Prashar, Shaw & Takeuchi, 2012, p.1616). A score from 1 (poor) to 5 (best) should be given to each parameter and a score of 1 (unimportant) to 5 (very important) should be given to each variable. The total score can be 125 (5x5x5), the higher the score, the higher the level of resilience.

Dimension	Physical	Social	Economic	Institutional	Natural
Parameter	Electricity	Population	Income	Mainstreaming of DRR and CCA	Intensity/severity of natural hazards
	Water	Health	Employment	Crisis management	Frequency of natural hazards
	Sanitation & solid waste disposal	Education and awareness	Household assets	Knowledge dissemination & management	Ecosystem services
	Accessibility of roads	Social capital	Finance and savings	Institutional collaboration	Land use
	Housing and land use	Community preparedness	Budget and subsidy	Good governance	Environmental policies

Figure 2: Dimensions and parameters of CDRI

4.3.2. Coastal City Flood Vulnerability Index (CCFVI)

The Coastal City Flood Vulnerability Index (CCFVI) is an index that identifies the flood vulnerability of a city (Balica, Wright & Van der Meulen, 2012). If the index is used properly, it can contribute to 'making decisions with regard to development in specific areas and possible funding allocation for adaptation and reduction of flood vulnerability in urban areas' (Balica et al., 2012, p.100). The CCFVI focusses on large cities near the coast because they are more vulnerable to the effects of climate change. I chose to include this index because it comprises a full analysis of not only aspects that negatively, but also positively influence vulnerability. Although the index focusses mainly on floods, it could also be applied in a broader context of climate change risks. The creators of the tool emphasize that the tool should be used in combination with participation methods, in order to obtain the views of both 'representatives of society and expert judgment' (Balica et al., 2012, p.100).

The coastal vulnerability system, as shown in Figure 3, can be separated into three interacting subsystems: the natural, socio-economic, and politico-administrative subsystem (Balica et al., 2012). For sustainable management to be effective, it is necessary to understand these subsystems, their processes and the relationship between the systems. The natural subsystem consists of biological, chemical and physical processes (Balica et al., 2012). The socio-economic system includes 'societal activities related to the use of the system: rules, institutions that mediate human use

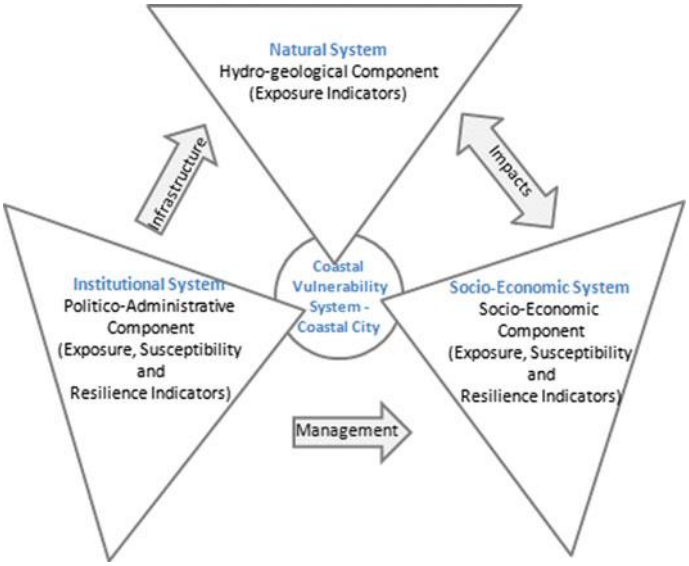


Figure 3: The coastal vulnerability system

of resources, systems of knowledge and ethics that interpret natural systems from a human perspective' (Berkes & Folke as cited in Balica et al., 1998, p.76). The administrative and institutional system contains the decision-making, management and planning processes. Every subsystem consists of indicators on the three factors that, according to the creators of the tool, represent vulnerability: resilience, susceptibility and exposure (Balica et al., 2012). Resilience is 'the capacity of a system to adapt to any change, by resisting or modifying itself, in order to maintain or achieve an acceptable level of functioning and structure' (Balica et al., 2012, p.80). Susceptibility refers to 'the elements exposed within the system which influence the probabilities of being harmed at times of hazardous floods' (Balica et al., 2012, p.79) such as preparedness and awareness. Exposure involves everything that is at or near the location that is threatened by a hazard.

The indicators for every component, or subsystem, can be found in the following table:

Natural subsystem	Socio-economic subsystem	Politico-administrative system
sea-level rise storm surge number of cyclones river discharge foreshore slope soil subsidence coastline	cultural heritage population close to coastline growing coastal population shelters percentage of disabled persons awareness recovery time km of drainage	flood hazard maps institutional organisations uncontrolled planning zone flood protection

Table 5: Indicators for each subsystem in the flood vulnerability index

For every indicator a score is given regarding its contribution to vulnerability on a scale from 1 (least) to 5 (most). The index does not only entail variables that negatively influence (increase) vulnerability, but also positively influence (decrease) vulnerability, such as shelters. The end score is a value between 0 (lowest vulnerability) and 1 (highest vulnerability) and can be calculated with the following formula (Balica et al., 2012, p.85):

$$\text{Total FVI} = \text{Hydro}-\text{Geological} + \text{Social} + \text{Economic} + \text{Politico}-\text{Administrative}$$

$$\text{Total FVI} = \left\{ (\text{SLR,SS,\# Cyc,FS,RD,Soil,CL}) + \left(\frac{\text{CH, PCL, \%Disable}}{S, A/P} \right) + \left(\frac{\text{GCP}}{\text{RT,Drainage}} \right) + \left(\frac{\text{FHM, UP}}{\text{IO,FP}} \right) \right\}$$

Figure 4: Calculation of score on flood vulnerability

4.3.3. Multi-Dimensional Urban Vulnerability Assessment (MDUVA)

The urban vulnerability assessment, as shown in Figure 5 on the next page, is developed to understand 'the impacts of climate change-induced hazards' (p.149) in urbanized areas (Herslund et al., 2015). The developers of this framework emphasize the complexity of the framework and point out that using the

framework, as it is now, to determine vulnerabilities within a city would be difficult for practitioners and express the necessity for a 'comprehensive, ready-to-use assessment approach' (Herslund et al, 2015, p.68). Opposed to the tools previously discussed, this assessment requires an excessive study of data to determine vulnerability instead of scoring it on a scale from 1 to 5.

The framework for the assessment consists of four dimensions of vulnerability that determine exposure, adaptive capacity and coping sensitivity for three different scales. The combination of asset vulnerability, attitudinal vulnerability, physical vulnerability and institutional vulnerability provides a total overview of the vulnerabilities for the selected scale within a city. A total of three scales is examined, namely cities, communities and households. Asset vulnerability is determined by material resources such as health, education and financial capital (Herslund et al., 2015). Awareness and social capital are aspects that determine attitudinal vulnerability. Attitudinal vulnerability entails 'attitudes to risk, hazard experiences and relations between people' (Herslund et al., 2015, p.5), for example being part of informal social networks that can be of help during disasters. Physical vulnerability focusses on the physical environment, for example green areas and infrastructure. Institutional vulnerability focuses particularly on actors, institutions and structure of local governance (Herslund et al., 2015). The assessment was executed using multiple types of data, such as forecast models, policy documents, workshops with stakeholders, and interviews. Indicators for each dimension were created based on this data, and weighted by relevant stakeholders, both governmental as well as nongovernmental.

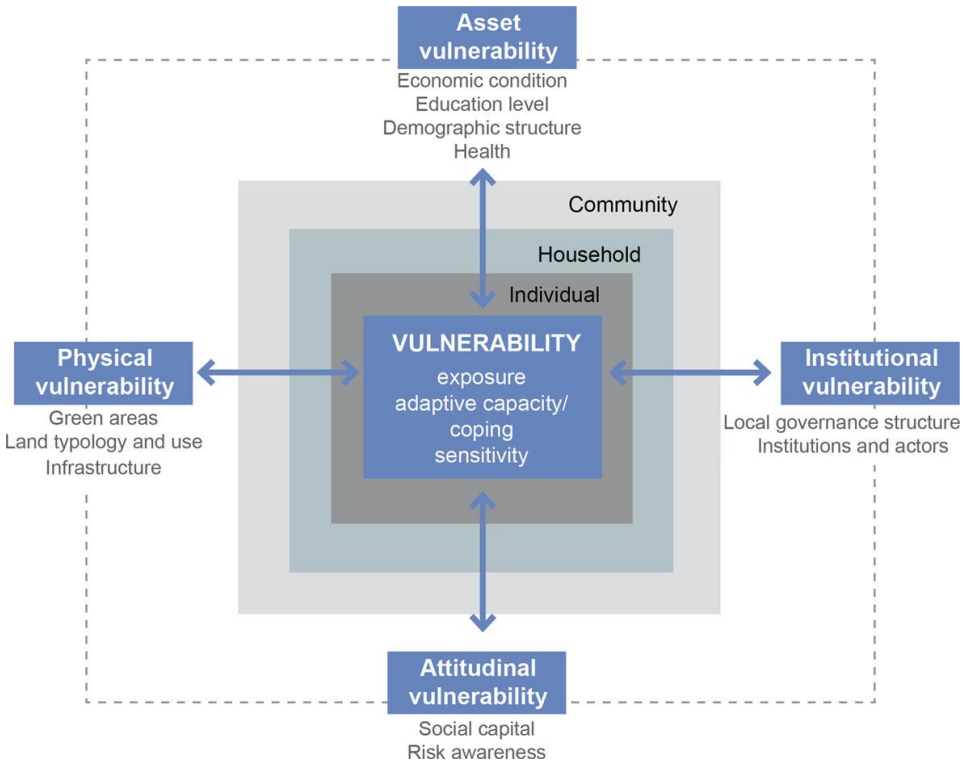


Figure 5: Multi-dimensional assessment of urban vulnerability

4.3.4. Disaster Resilience of Place (DROP) model

The disaster resilience of place model is not a tool in itself but a model developed to 'improve comparative assessments of disaster resilience at the local or community level' (Cutter et al., 2008, p.598). Although it is created for natural hazards, it can also be used for other rapidly starting events (such as terrorism) or slowly originating events such as droughts. Cutter et al. state that different dimensions of resilience can be distinguished in scientific literature that each require a different form of measurement. These dimensions are: 'ecological, social, economic, institutional, infrastructure and community competence' (p.604). The indicators to measure these dimensions are unlimited, but the authors propose several indicators for each dimension to determine community resilience (Cutter et al., 2008). Cutter et al. emphasize the importance that should be attributed to 'the temporal scale at which resilience is measured' (p.603) since it affects the choice of indicators.

Factors such as redundancies, biodiversity, spatiality and governance plans influence ecological resilience (Cutter et al., 2008). Examples of ecological indicators are: 'wetland acreage and loss; erosion rates; percentage of impervious surface; biodiversity; and number of coastal defence structures' (p.604). Social resilience is determined by the level of preparedness and awareness and can be increased by implementing disaster preparation plans and information sharing (Cutter et al., 2008). Examples of social indicators are: 'demographics such as age, race, class, gender, occupation; social networks and social embeddedness; community-values-cohesion; and faith-based organizations' (p.604). Indicators for economic resilience tend to focus on measuring business disruption and property loss due to a disaster (Cutter et al., 2008). Economic resilience allows for a reduce in monetary loss and can be achieved through mitigation measures that reduce the probability of a disaster. Examples of economic indicators are: 'employment; value of property; wealth generation; and municipal finance/revenues' (Cutter et al., 2008, p.604). Physical and management aspects of organizations determine organizational resilience (Cutter et al., 2008). This involves for example size and structure of an organization and experience, training and leadership of its members. Examples of institutional indicators are 'participation in hazard reduction programs; hazard mitigation plans; emergency services; zoning and building standards; emergency response plans; interoperable communications; and continuity of operations plans' (Cutter et al., 2008, p.604). Infrastructure resilience is determined by the physical components of infrastructure, such as roads and pipelines, and their dependency on each other. Examples of indicators to measure infrastructure resilience are: 'lifelines and critical infrastructure; transportation network; residential housing stock; and age and commercial and manufacturing establishments' (Cutter et al., 2008, p.604). Community competence is a form of resilience that focusses on the functioning of society on aspects such as quality of life, wellbeing and health. Community competence can be measured with, for example, the following

indicators: 'local understanding of risks; counselling services; absence of psychopathologies; health and wellness; and quality of life' (Cutter et al., 2008, p.604).

4.3.5. The MOVE framework

The research project MOVE (Methods for the Improvement of Vulnerability Assessment in Europe) has developed a framework, as shown in Figure 6, that can be used as 'a basis for systematic operationalization of vulnerability' (Birkmann et al., 2013, p.207). It is a comprehensive approach that outlines several dimensions (cultural; ecological; economic; institutional; physical; and social) and key aspects of vulnerability (exposure; lack of resilience; and susceptibility) that are necessary to address in climate change vulnerability assessment. The three aspects of vulnerability are defined as follows: exposure is the extent to which the subject is within reach of the hazardous event, susceptibility entails the elements that are at risk, and lack of resilience is determined by 'limitations in terms of access to and mobilization of the resources of a community or a social-ecological system in responding to an identified hazard' (Birkmann et al., 2013, p.200). All dimensions focus on one part of the system that may be damaged if assessed as vulnerable: human well-being (social), economic loss (economic), infrastructure (physical), values (cultural), ecological (environmental), and governance systems (institutional).

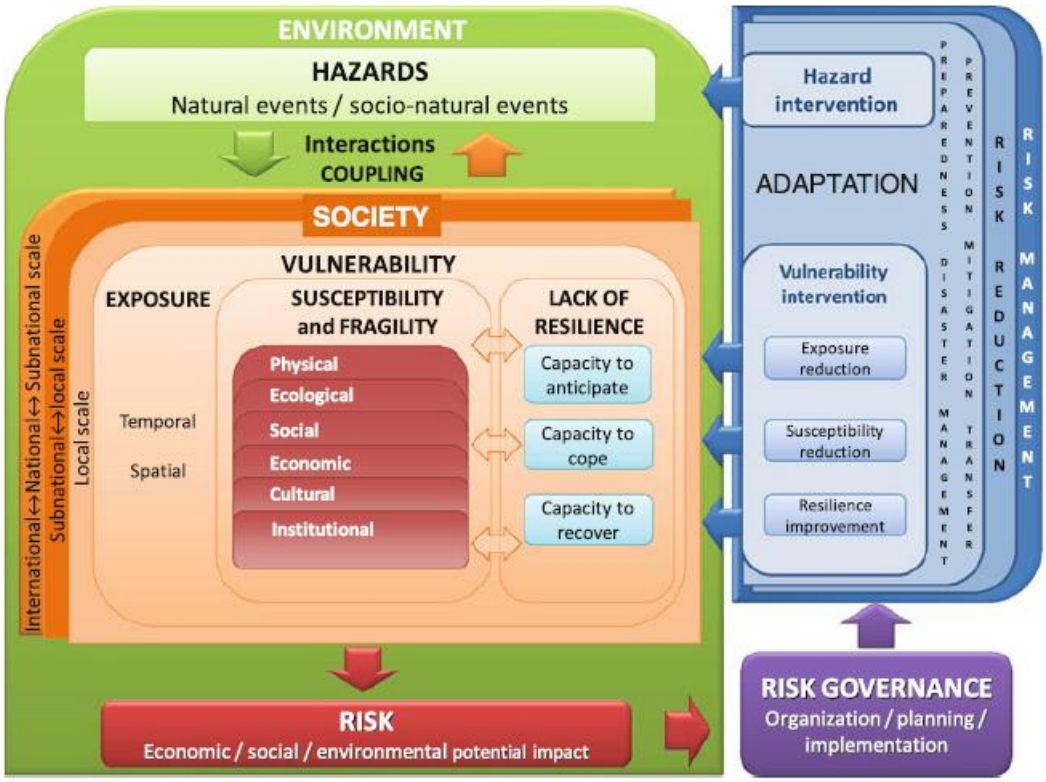


Figure 6: MOVE framework

4.3.6. Comparison of the assessment methods

The above described methods to measure vulnerability or resilience differ in most aspects. The CDRI, CCFVI and MDUVA are actual measurement tools, whereas the DROP and MOVE are models to create such a measurement tool. The goal of these methods is to gain insights in the current state of vulnerability or resilience, but the specific goal is related to the measurement level. The CCFI determines only the current state of a city and therefore only measures at the city level. On the contrary, the CDRI and the MDUVA are comparative of nature and measure at the community or neighbourhood level because the goal of this assessment is to compare different areas and determine which area(s) should get attention or resources. The DROP and MOVE model, on the other hand, are designed to support the development of new assessments and provide insights in the dimensions and aspects that should be considered when creating indicators to measure vulnerability or resilience.

All methods use different names for the dimensions, but the content is more or less the same. The only assessment that deviates in terms of classification is the MDUVA method. The five dimensions that are used in all other assessments are: natural/ecological, physical/infrastructure, economic, social and institutional. Two deviating dimensions are community competence and cultural, both of which occur in only one method. Three out of the five methods distinguish the aspects that form vulnerability: exposure, susceptibility and resilience. Two methods use scores to determine the level of vulnerability or resilience (the CDRI and the CCFVI). All dimensions have a set of indicators that need to be scored from 1 (lowest) to 5 (highest). The sub scores provide insights for every dimension and the final score determines the integral level of vulnerability or resilience. Giving a score makes it easier to carry out the assessment. The MDUVA, on the other hand, has no predetermined indicators, but these are formed on the basis of data analysis. Each indicator is given a weight by relevant stakeholders, but researchers determine the final level of vulnerability. The methods vary in the level of complexity. The DROP and MOVE models are the most difficult to use because they are frameworks to create indicators and measuring methods. The CDRI and CCFVI appear to be very straightforward and quick methods to assess vulnerability which suggests that they are not burdensome to use, also for non-academics. The MDUVA is the most complex tool and the creators state that it would be difficult for practitioners to use it.

Some remarks should be made regarding the methods to measure vulnerability or resilience. Firstly, the outcome of a tool always depends on the interpretation and knowledge of the respondent. Secondly, the results are not absolute values but only provide insights that can be used in policy or decision making. And thirdly, some of the assessments or frameworks are very complex or extensive and probably too burdensome to use for practitioners. For example, the MDUVA requires an excessive data study, which entails that a lot of time should be put into implementing the tool.

4.4. General aspects of vulnerability and resilience assessment tools

Analysing these methods has provided insights in the aspects that should be included in vulnerability or resilience assessment. The level of analysis depends on the goal of the assessment. If the goal is to identify vulnerability or resilience of a city as a whole, it is only necessary to analyse the city level. If the goal is to make a decision on distributing attention or resources, it is necessary to analyse multiple community or neighbourhood levels and compare the results. Every dimension (that is: natural/ecological, physical/infrastructure, economic, social and institutional) of vulnerability or resilience should be included and attention should also be paid to fundamental characteristics of the concept, such as exposure and susceptibility. The indicators in the assessment should both take aspects into account that negatively influence vulnerability or resilience, as well as those that positively influence them. In the context of this research, it would also be important that an assessment can be carried out easily and quickly, so it is as less as a burden as possible for the practitioners. This indicates that there is a preference for methods in which indicators and calculations are already determined. Easiness to use is for example advanced when a scoring system from 1 to 5 is used.

5. Participatory mechanisms in Zwolle and Enschede

Climate change adaptation in the Netherlands is stimulated by the DPRA. This plan is part of the Delta Program of 2018 and is the implementation program for the Delta Decision on Spatial Adaptation. An interim evaluation of the Delta Decision shows that spatial adaptation is mainly seen as non-committal and that there are major differences between municipalities, both in awareness of the necessity for adaptation as well as in the analysis and approach of spatial adaptation. Although adaptation was of great importance, its urgency has increased over the past years. Therefore, it is necessary to accelerate and intensify the current approach, which is not sufficient to limit climate change risks (water nuisance, heat stress, drought and flooding). Spatial adaptation concerns, according to the plan, the change in the layout and use of the environment, including housing, businesses, gardens, public space, infrastructure, agriculture and nature. The intermediate objective of the Delta Decision on Spatial Adaptation is that climate-proof and water-robust design must be part of public policy and governmental action by 2020. This means that climate resilience and water robustness are taken into account in local and regional spatial considerations. Ultimately, climate resilience and water-robustness must be realized in the physical spatial design by 2050. The plan emphasizes cooperation between different organizations, including governmental organisations, industry, civil society organizations and knowledge institutes. The methodology of 'wanting, knowing, and working' (identifying vulnerabilities, formulating ambitions, and creating a climate-resilient environment) is used to achieve both objectives, which includes seven ambitions: identifying vulnerabilities; conduct a risk dialogue and formulate a strategy; prepare an implementation agenda; utilize linking opportunities; stimulating and facilitating; and regulating/safeguarding (being able to act during emergencies).

This chapter discusses the participatory mechanisms that the cities of Enschede and Zwolle have used in the implementation of the first two ambitions of the DPRA, that is identifying vulnerabilities and conducting a risk dialogue. The first section focuses on Enschede and the second section focuses on Zwolle.

5.1. Enschede Case

The city of Enschede has developed a method that allows them to classify risks, which they call 'the risk-based water management'. The municipality identifies vulnerabilities with hydraulic calculation models that uses data from level measurements, reports and complaints from citizens and businesses, social media, and observations from district employees. Professional experts have participated in the development of this method, but citizens have not. Citizens do participate in policy making, but at a

lower level – the project level. In the project Stadsbeek, the following participatory mechanisms have been applied: collecting information, informing and engaging the public, and co-designing.

The risk-based water management method is further discussed in the first section of this chapter and information about participation in the development of this method can be found in the second section. In the third section, the project Stadsbeek and the participatory mechanisms in this project are discussed.

5.1.1. The risk dialogue in Enschede: risk-based water management

If the risk dialogue definition of De Graaff et al. (2018) is applied, the municipality of Enschede has not conducted a risk dialogue. However, the municipality of Enschede has developed a methodology to classify risks, which they describe as their risk dialogue.

In 2012, the municipality has started with the development of 'risk-based water management', a method to determine and classify risks related to water – that is water nuisance on the street and water nuisance in houses. The other risks that arise because of climate change – droughts and heat stress – are not included in this method, and are not yet being addressed in Enschede (Meijer, 2018). Therefore, these paragraphs will only discuss the risk dialogue and participation for water nuisance. The method is developed in order to be able to better prioritize activities or risks and argue why. It is thus a rational method to weigh risks and determine the course of action (Meijer, 2018). The goal of risk-based water management is to enable the discussion about vulnerable locations and the effects and risks that can be present there to determine if action should be initiated. The measures that are necessary to mitigate the risk and its costs are examined and a balance is sought between the acceptance of the size of the risk and the costs of the measures (Meijer, 2018). The municipality emphasizes that this discussion creates awareness about the risks and possible solutions such as closing a tunnel when it is known that heavy rainfall will occur (Hartemink & Meijer, 2015). The municipality wants to prevent or limit major risks, and accept smaller ones. Priority is given to the measures that are most effective or achieve multiple goals at once.

In order to make well considered decisions, information about the risks and risk locations is required. This information is obtained via hydraulic calculation models that uses data from level measurements, reports and complaints from citizens and businesses, social media, and observations from district employees (Gemeente Enschede, 2015). The municipality is already aware of the risks that arise because of water nuisance and is capable of quantifying them through the use of calculation models. The calculations from the models are checked on accuracy after an event that provides new measurement data. The flow of rainwater during heavy rainfall is shown using the same calculation model, but then supplemented with the actual height of the ground level and data on ponds, streams

and singles on which overflows from the sewerage are discharged. These calculation models provide insights in the risks and their locations, and thus the bottleneck locations in the city.

After determining the bottlenecks, it is necessary to determine how big the risk of these bottlenecks is. Every risk is eventually labelled as low, moderate, high or extreme. Only moderate and low risks are accepted in Enschede, if a risk is high or extreme, action will be initiated to mitigate the risk. The calculation of the risk is based on the combination of the extent to which the organizational values of the municipality of Enschede are at stake and the chance of heavy rainfall (Gemeente Enschede, 2015). These organizational values are safety and health, quality of the living environment, finance and image. Several indicators are created for each organizational value. For example, the indicators for safety and health are: victims, sick persons and wounded. To determine the extent to which organizational values are at stake, an analysis will be made on the following subjects: 'water level on the streets; duration of water on the street; scope of water nuisance; number of sewer pits under pressure; type of road; and number of houses, shops or businesses that are flooded' (Gemeente Enschede, 2015, p. 37).

5.1.1.1. Participation in risk-based water management

Knowledge and expertise from different organizations and disciplines was used for the development of risk-based water management. Several departments within the municipality, such as Urban Development and Living Environment involving different disciplines such as transport and landscape planning, and different organizations outside the municipality that are involved in water management or water related risks such as RIONED, STOWA and the GGD have contributed to the development of the risk-based water management method. Eventually, the city council has decided, for the entire municipality, which risks are accepted and which are not.

The development of risk-based water management started with research on asset management in the form of a 'living lab' (Hartemink & Meijer, 2015). The municipality of Enschede started this research in collaboration with RIONED, STOWA and the Waterboard Regge and Dinkel (now named: Vechtstromen). In 2012, several workshops were organized in which the different disciplines from in- and outside the municipal organization have developed instruments that can be used by the municipality to make risk-based considerations (Hartemink & Meijer, 2015). Additionally, meetings were organized with all disciplines within the municipality and the waterboard that engage in water management to share knowledge with each other.

In the development of this method, only decision-makers and professional advisors from in and outside the municipality were included. Therefore, the breadth of participation is scored as narrow. The organizations and stakeholders that were involved in the development did have much influence on the design of the method, therefore this type of participation is collaborative of nature.

The stakeholders were involved from the beginning – that is planning phase – of the project, therefore this type of participatory activity is scored as very open. The goal to involve stakeholders is instrumental, their knowledge would contribute to the process. The intensity of the participation is high, because the stakeholders attended many meetings during the entire process of developing the methodology.

During the development of the risk-based water management method, there was direct participation from stakeholders other than citizens, but no participation from citizens, and in the decision-making phase there was indirect participation from citizens but no participation from stakeholders other than citizens. The rationale behind letting the city council decide on the matter was that the citizens of Enschede have chosen the city council, and thus indirectly choose on the acceptability of risks. Hence, citizens were not directly approached and asked regarding which risks the municipality should consider as acceptable and which not (Meijer, 2018). Citizens were also not involved in the development of the risk-based water management method. However, and most importantly, citizens are closely involved in developing measures and realizing solutions that meet their needs at the project level (Meijer, 2018). Therefore, I discuss participation in the specific project of Stadsbeek in the following section.

5.1.2. Stadsbeek Project

Stadsbeek is a project that involves groundwater nuisance in Pathmos and Stadsveld neighbourhoods. They experience this water nuisance because Enschede is built on a moraine and they are located at the bottom. Enschede lacks a natural drainage system, which makes drainage more difficult. Therefore, besides their own rainwater, these neighbourhoods should also process rainwater from areas higher on the moraine. In addition, the sewers in these districts are sensitive to overload. Therefore, the municipality and the waterboard have conducted research regarding the Stadsbeek, after which the concept is designed with the residents of these neighbourhoods. This measure mitigates and perhaps even solves the problem of water nuisance in the neighbourhood because it provides the opportunity to drain extra groundwater and rainwater. A part of this system takes place underground and a part above ground as a stream. This stream decreases the water nuisance and improves the quality of surface water, but simultaneously contributes to sustainability and the quality of the living environment. In project Stadsbeek, the following participatory activities can be distinguished: collecting information, informing and engaging the public, and co-designing. These are elaborated below, applying the five aspects of public participation, i.e., breadth, intensity, influence, openness and goals.

5.1.2.1. Collecting information from the public members

Before the project Stadsbeek officially started, the municipality distributed a survey among the residents of the neighbourhoods with questions regarding the water nuisance. There was a response of 34%, which was seen as positive. The results of the survey confirmed that residents suffer from high groundwater levels on the street. Subsequently, 75 residents were visited at their homes to gain better insights in the nuisance. Eventually, the decision is made to start with the project based on this data and the complaints that the municipality and the housing corporations received over the past years. The municipality even stimulated citizens to complain about water nuisance at the municipality or housing corporations, so they gained better insights in the problems (Gemeente Enschede, 2015b).

The breadth of this type of participation is moderate because all residents from the neighbourhood received the survey, but no one outside the neighbourhoods could participate. Thus, only directly-affected public members are involved. The intensity of this activity can be also be assessed as moderate. Every resident has been approached and provided with the opportunity to participate in an early stage of policy making. Every step within the participation process becomes more intense, because the contact between municipality and resident becomes more personal. The participants do not have much influence, they can only inform the municipality but not influence their decision. Therefore, the influence remains at the lower level, i.e., 'inform'. The openness of participation is high, because it started in the first phase of policy making. This type of participation has an instrumental goal, namely to collect information about and identify the problem in the neighbourhood.

5.1.2.2. Informing and engaging the public

The public was informed during the entire project via newsletters. All residents in the neighbourhoods received a newsletter in their mailbox and the newsletters were made available on the website of the municipality for everyone with an interest in the project. The first newsletter was published in February 2015 and was followed up by 11 other newsletters till now of which the last one was published in December 2018. The newsletters provided the reader with general information about the problem and its cause (Gemeente Enschede, 2015a). The municipality used them to publish their plans for the districts for each phase, and to provide information about cooperation with several stakeholders. Action perspectives and contact numbers were also distributed through the newsletters. For example, the newsletter explained what citizens could do when they experience water nuisance in the public space or in their own basements (Gemeente Enschede, 2015b). The newsletters were also used to invite citizens and organizations in the neighbourhoods to contribute to the project. They were invited to attend information meetings and designing sessions. Many informative meetings have been

organized during the entire project. At least two meetings were organized every time the contractor is about to start with a new phase of the project (Gemeente Enschede, 2015b). Two meetings were organized when the prototype of the Stadsbeek was finished, which were visited by approximately 100 residents (Gemeente Enschede, 2015c). The municipality presented the prototype and every resident had the opportunity to review and provide feedback. Civil servants were also present to inform residents in more detail and advise them on what they could do themselves to mitigate water nuisance (Gemeente Enschede, 2015c). The same accounts for the prototype of the Pinkeltjesplein, which was also presented to a broader public to receive feedback (Gemeente Enschede, 2017a).

The newsletter is thus used as an important communication medium. Not only to inform citizens about the project or provide them with action perspectives, but also to invite them to participate in the project. The organized meetings were mostly informative of nature, but in some cases were focused on collecting feedback. Three different types of participation can be distinguished, that is the newsletter, the informative meetings, and the feedback collecting meetings.

The newsletter is directly distributed to the directly-affected public, but also made public on the website of the municipality. Therefore, the breadth of this type of participation is broad. Anyone who is interested in the project is included. The first newsletter was distributed in February 2015, after the municipality collected information with the survey, but before the official decision was made by the municipal council to start the project. This indicates that participation happened at the planning phase. Since newsletters are distributed during the entire project, the participation activity seems to be very intense, and would thus score high. The citizens did not have any influence on the policy through the newsletters, therefore influence is scored as inform. The goal of the newsletter is both intrinsic, as a means of procedural justice, in the sense that residents have to be informed about changes in their direct surroundings as well as instrumental. The latter because the newsletter is used as a means to inform, invite and involve citizens.

The informative meetings were open for any public. The invitation for the meeting was send via post directly to the affected public, but also announced in the newsletters, that were available to anyone. Therefore, the breadth of this type of participation is broad. Anyone who is interested is included. Many informative meetings were organized, of which the first in February 2015 and the last (known) in June 2018. The openness of this participation activity is therefore planning, action development and implementation. Evaluation is not yet taking place because the project is still ongoing. In the newsletters, six meetings were announced, and several were discussed of which no exact date is known. Since many meetings took place during the entire project, the intensity is scored as high. The residents did not have any influence on the policy during the informative meetings because they were informative of nature. Therefore, influence is scored as inform. The goal of the

meetings is probably intrinsic, as a means of procedural justice, in the sense that residents have to be informed about changes in their direct surroundings.

The meetings that had the goal of collecting feedback on the prototype of the area design were specifically organized for the residents in the two neighbourhoods. Therefore, this type of participation is moderate. The feedback collecting moments took place when a prototype design was already finished but not yet definitive and is thus taking place during the planning phase. A total of three feedback meetings took place, therefore the intensity is scored as moderate. The citizens did have some influence in the feedback collecting meetings because their opinion was asked, therefore influence is scored as consult. The goal of the feedback collecting meetings seems to be both intrinsic as well as instrumental, but this is difficult to judge based on public documents. The first because giving residents the option to provide feedback gives them a voice, and thus democratic expression. The second because residents may have information that contributes to the solution to water nuisance that can be used in the design of the area.

5.1.2.3. Co-designing the area with public members

In the first newsletter about the Stadsbeek, residents were invited to contribute to the design of the stream and surrounding areas (Gemeente Enschede, 2015a). Thereby, the municipality not only solves the water nuisance problems, but also take the wishes and ideas of residents into account. Residents were provided with the opportunity to sign up for participation in the design of the stream, after which the municipality contacted each of them personally (Gemeente Enschede, 2015b). A total of 25 residents came together on two evenings to share their ideas and design the area together with a professional designer from the municipality (Gemeente Enschede, 2015; Gemeente Enschede, 2015c). Beside the stream itself, a square is also designed in corporation with closely surrounding residents and persons who were earlier involved in the development of the temporary playing area. Together with a designer from the municipality, the residents decide on the design of the area (Gemeente Enschede, 2017a).

Residents are closely involved in the design of the stream, the surrounding area and the square. Since the newsletter contained an invitation to participate in the design process, it can be assumed that not only the directly-affected public, but anyone interested can participate. The breadth of this type of participation would thus be broad. The design meetings took place in the beginning of the project, when the exact execution and design of the area were not yet finished but plans were already made. Openness is thus marked as action development. The design of the area is created in two meetings with a small group of citizens. The citizens that participated therefore had a lot of influence, since they were allowed to design the area in cooperation with a professional designer. The influence of this type of participation is therefore collaborate. Intensity is scored as moderate because

there were only two official design meetings. Those who were involved in the meetings probably were involved and present at the other meetings as well, but these meetings are not included in this score. The goal of involving citizens in the design of the area can be both intrinsic as well as instrumental because it contributes to democratic justice, but also may improve the quality of the policy through the knowledge of residents.

5.1.2.4. Other initiatives

Besides involving citizens in the design of the area, the municipality also provided them the opportunity to dedicate themselves to the neighbourhood in a different way. Residents were invited to come up with ideas that would improve the neighbourhood (Gemeente Enschede, 2015b). Those who provided input were contacted by the municipality to further develop the ideas. One of the residents wanted to improve green space between flats, this idea was further elaborated in collaboration with the foundation Nature and Environment Overijssel (Gemeente Enschede, 2016a). This foundation knows a project that supports initiatives such as this that improve the development of green in the neighbourhood, in order to improve the quality of life and make the area more attractive. Together with the residents of these flats, the foundation and the initiator brainstormed on how they could make the green space more attractive, and how a new design could contribute to the retainment of water. Although a small group of citizens started the project, the group expanded through (news)letters and meetings (Gemeente Enschede, 2016a). Several stakeholders were involved, and had different preferences for the layout of the area. Their wishes were combined and with the help of a consultant, the residents designed an area that took the wishes from all parties into account (Gemeente Enschede, 2016b). The municipality was not a leading partner in this subproject and neither financed it. The area was not part of the public space, but property of the House Owners Association. Therefore, the municipality could not finance it with public money, they did however help with arranging financing. The province of Overijssel eventually financed part of the subproject with a subsidy (Gemeente Enschede, 2017a). The other part of the project was paid for with district budget that was brought in by the residents. The residents' committee was also closely involved, and supervised the execution of the activities (Gemeente Enschede, 2018a).

From the perspective of the municipality, this type of participation would be empowerment. That is not to take a leading role, but empower others to initiate action. In this case the project is started by one resident, and supported by a foundation. The participants have a lot of influence because they can make the decisions instead of the municipality. Since this can be seen as a subproject within the Stadsbeek project, the participation started at the earliest stage possible, that is the pre-planning phase. The breadth was narrow, because only a limited group of residents were active in the beginning, but changed to broad, because everyone was invited to participate through newsletters

and meetings. The intensity is high, because the participants were the leading partner in the project, and thus had to invest most time. It is hard to determine the goal of participation, because the residents initiated the project, and would therefore not be labelled as a participation option. Without them participating, there would be no project. The goal to involve the foundation and province as participants would be for the resources they bring, and thus instrumental.

5.1.2.5. Stakeholder participation

In addition to the aforementioned parties, with whom some form of participation exists, such as residents, the waterboard, the nature and environment foundation, the province, housing corporations, businesses and knowledge institutes, some forms of participation have not been mentioned yet. For example, the schools in the neighbourhood, of which several are involved in the project as well. With the Bonhoeffer College, collaboration took place because the stream flows right next to their property. The municipality also discussed the problems with a primary school in the neighbourhood and found a possibility to cooperate regarding their schoolyard. This schoolyard needs a makeover, and the municipality wants to join to see whether there is a possibility to combine this makeover with room for water retainment. It currently is only an idea, and a concrete plan is yet missing (Gemeente Enschede, 2015c). Another primary school contributed to the development of the area by planting trees at the edge of the stream. The municipality has also been approached by a company in the area that wants to stimulate the diversity of flora and fauna in the neighbourhood. In order to realize this goal, the company donates an amount of money for a period of four years to decorate the stream (Gemeente Enschede, 2016b).

5.1.2.1. Overview of the structure of participation per type of activity

Table 6, on the next page, provides an overview of the different participatory activities that can be distinguished for the project Stadsbeek. They are elaborated in the previous sections applying the five aspects of public participation, i.e., breadth, intensity, influence, openness and goals.

Activity	Breadth	Intensity	Influence	Openness	Goals
Collecting information from public member					
Survey	Moderate	Moderate	Inform	Pre-planning	Instrumental
Informing and engaging the public					
Newsletter	Broad	High	Inform	Planning	Both
Informative meetings	Broad	High	Inform	Planning	Intrinsic
Feedback meetings	Moderate	Moderate	Consult	Planning	Both
Co-designing the area with public members					
Design meetings	Broad	Moderate	Collaborate	Action development	Both
Other initiatives					
Empower extern cooperation	Broad	High	Empower	Pre-planning	both
Stakeholder participation					
Cooperation with stakeholders	Moderate	Low	Low	Implementation	intrinsic

Table 6: Structure of participation per type of activity in Enschede

5.2. Zwolle Case

An official risk dialogue has not yet taken place in Zwolle, whereas the development of a city-level climate change adaptation strategy is ongoing. The municipality does, however, use opportunities to increase climate resilience in Zwolle. Identifying risks is done using maps, stress tests, calculation models and complaints from citizens. The main focus of the city is to facilitate citizens' initiatives regarding climate adaptation. Professional experts and organisations do participate via partnerships with the municipality, and citizens can participate by initiating adaptation measures. In the Seringenstraat project, the following participatory mechanisms can be distinguished: collecting information, meetings, informing, designing and empowering.

The general climate adaptation approach in Zwolle is described in the first section. This is followed by a description on identifying climate change risks and risk locations (the first ambition of DPRA) and the discussion about and prioritizing of these risks (the second ambition of DPRA). Finally, the participatory mechanisms in the Seringenstraat project are described in the last section.

5.2.1. Climate adaptation strategy

Official risk dialogues are not yet taking place in Zwolle yet (Vrouwe & Postma, 2019). Brainstorming on risk dialogues has already started, but there do not yet exist concrete plans and the implementation of risk dialogues has not yet begun. To realize the development of risk dialogues, the municipalities applied for subsidies, but they have not yet been honoured (Vrouwe & Postma, 2019). Currently, discussions are being held on how to address the risk dialogue, because other projects are simultaneously ongoing and also require dialogues with citizens. The municipality wants to ensure that citizens are not approached for official risk dialogues too often. However, it is emphasized that the municipality is always discussing issues with residents (Vrouwe & Postma, 2019).

Despite the fact that there are many agendas for different subjects, such as water, green space and sustainability, the city does not know a concrete climate change adaptation plan or method. The city is working on a climate change adaptation strategy, which will also include the development of risk dialogues (Vrouwe & Postma, 2019). The strategy will thus clarify what the dialogue should involve, what the role of the citizens can or should be in this dialogue, and the level of influence citizens will have. Citizens will not be involved in the development of this strategy (Vrouwe & Postma, 2019). The water agenda states that vulnerabilities that arise because of climate change should be identified, as well as possible measures for different levels, and a financial strategy should be developed for the adaptation strategy (Gemeente Zwolle, 2015a).

Although the official climate change adaptation strategy is not finished yet, opportunities to increase climate resilience in Zwolle are being used. The Climate Active City program is a major program in the city, and the municipality focusses on stimulating and facilitating initiatives from citizens that contribute to water awareness and climate resilience (Gemeente Zwolle, 2015a). The Climate Active City is a program within the IJssel-Vechtdelta region of which Zwolle is part, that jointly works on the adaptation of the living environment to climate change (IJssel-Vechtdelta, 2015). The program consists of several activities that are executed by, among others, social organizations, entrepreneurs and local resident groups. The activities relate to four topics: water robustness in the city and country, linking opportunities in the neighbourhood, regional innovation power and water awareness in society (IJssel-Vechtdelta, 2015). The projects within this program are all individual adaptation projects at different scale levels. One of these initiatives is ‘Groen Assendorp’, a project in Zwolle which will be elaborated in more detail in section 5.2.1.

5.2.2. Risk identification and prioritization

The risks related to climate change in Zwolle are known by the municipality, on the one hand because of calculations and on the other hand because of maps and stress tests (Gemeente Zwolle, 2015a). The effects of climate change, such as water damage due to heavy rainfall, health issues, and a decrease in

productivity during heats tress, are discovered through the use of a stresstest. Through the use of maps, insights have been gained regarding the vulnerabilities and opportunities caused by extreme weather events (Gemeente Zwolle, 2015a). Besides the use of maps and stress tests, the municipality is also able to calculate the possible effects of water nuisance and determine which locations in the city are more vulnerable to water nuisance or flooding. However, these calculations are only possible for the water theme, and not for heat stress or droughts (Gemeente Zwolle, 2016). The municipality can make calculation of waste water drainage, sewage pumping stations, discharge pipes, heavy rainfall discharge, retention ponds and the level of water in the street due to extreme rainfall. It is also possible to integrate outflow in the street with sewage capacity, which allows the municipality to picture the water flow in a specific area (Gemeente Zwolle, 2016). Complaints and notifications from citizens are also an important information source, and sometimes lead to initiating action.

The policy plans of the municipality clearly show that the focus of the municipality is on facilitating initiatives from citizens. The groundwater management plan states for example, that the municipality does deal with complaints and analyses the causes, consequences and possible measures for this complaint but only develops measures when the measures taken by citizens are not sufficient or effective, or the problem is structural of nature (Gemeente Zwolle, 2016). It is thus expected of the citizen to initiate action. The municipality does support citizens' initiatives, for example through providing information, making the connection with relevant stakeholders, offer start-up money, or make working hours available (Vrouwe & Postma, 2019). The city does have budget for climate change adaptation to finance this, there also is an arrangement with the waterboard to finance small projects and every neighbourhood has its own budget.

Not all projects can be supported, but the municipality does not know a methodology regarding choosing between projects (Vrouwe & Postma, 2019). There are, however, several aspects that are considered when making a choice between options. These options are: maximum damage prevention, added value for the living environment of the city or neighbourhood, and the local economy (Gemeente Zwolle, 2015a). This entails that when considering options, the municipality does look at how much can be improved, and how interesting it is to do this (Vrouwe & Postma, 2019). However, it is often the case that the subject of climate adaptation is added to an ongoing project, and then there is no choice to be made. For example, a project is starting in a neighbourhood regarding the energy transition because that is an urgent theme in that neighbourhood. If a link with climate adaptation can be found, the subject will be part of the project although adaptation may not have any urgency (Vrouwe & Postma, 2019. An important consideration in the decision to start a project is that residents should be actively involved. The municipality also prefers to see that each neighbourhood has a successful project such as the project in Assendorp, because it may inspire citizens to take action themselves.

The municipality thus tries to step back and let citizens initiate action, and only initiate action on its own in case of structural problems, ineffective solutions from citizens, or when they can link with other (ongoing) projects. The task that results from this vision is to develop a social movement in which climate adaptation initiatives are set up by citizens, and to inspire citizens to make sustainable choices (Gemeente Zwolle, 2015b). Example projects such as Assendorp, are therefore promoted by the municipality, with the goal of inspiring other citizens to do the same. The project Assendorp was also a citizens' initiative, in which the municipality contributed. These types of projects should evolve in other neighbourhoods as well, to make sure that citizens awareness of climate change (risks) increases, which will be followed up by recognizing climate adaptation. Key figures in a neighbourhood that can act as ambassadors for such a project as Assendorp are of great importance (Vrouwe & Postma, 2019).

5.2.2.1. Participation at the strategic level

The municipality distinguishes three types of stakeholders and uses a different approach for each type. The municipality emphasizes the importance of linking these different types of stakeholders (or communities) to each other and stimulate cooperation between the communities (Vrouwe & Postma, 2019). Therefore, Zwolle started a pilot project that focusses on connecting them. The first community is at the local level and includes citizens from a specific neighbourhood or street (Vrouwe & Postma, 2019). The second community is the professional community, which includes the Climate Campus and the IJssel-Vechtdelta partnership. The third community is at a greater geographical area, that is the delta level (Vrouwe & Postma, 2019). One of the results of this pilot project is the Serious Game, which illustrates the cooperation between the professional community and the citizen community. The game will be developed in collaboration with citizens and used by citizens to gain insights in effects of adaptation measures at the local level, and it can also be used to contact professional companies with questions regarding the adaptation measures (Vrouwe & Postma, 2019). In this case, both professional organizations and citizens benefit from each other. Citizens can benefit from professionals when they are in need of advice on adaptation measures, and professionals can benefit from citizens regarding detailed information, for example about the neighbourhood. The municipality was the linking pin in this cooperation. The development of the Serious Game is still ongoing, and meetings between the different communities are going to be organized by the municipality.

The municipality of Zwolle has many partnerships with different organizations. These partnerships are structural of nature and do not focus primarily on climate change adaptation (Vrouwe & Postma, 2019). IJssel-Vechtdelta is one of the intensive partnerships of Zwolle and already exists for eight years. The partnership consists of the municipality of Zwolle, Zwartewaterland, Kampen and the province of Overijssel (Vrouwe & Postma, 2019). It originally started for water management, but shifted to climate change adaptation. The Climate Active City program, as discussed earlier, is also part of this

partnership. Another partnership is RIVUS, which focusses on the wastewater chain, but is also involved in climate change adaptation for Zwolle. The Climate Campus is also a partnership which exists since the summer of 2017 and consists of 45 parties that work together to a climate adaptive city. Besides governmental organizations, the partnership also involves entrepreneurs, businesses and educational institutions (Vrouwe & Postma, 2019).

5.2.3. Project Seringenstraat/Assendorp

The Seringenstraat is a street in the paved neighbourhood Assendorp located in the centre of the city of Zwolle. The neighbourhood experiences problems of heat stress and water nuisance during heavy rainfall because of the high degree of pavement. A house owner in Assendorp found out, after purchasing the house, that the soil was contaminated. Several residents suffered from the contaminated soil. When a developer wanted to redesign the contaminated area of the garage complex, the municipality saw an opportunity to join. In addition to financing the soil remediation, the municipality also investigated opportunities to link the project to current developments, such as energy transition and climate adaptation which are eligible themes for subsidy from different governmental organisations. This additional funding can be used to increase the attractiveness and efficiency of the area. The soil remediation is linked to climate adaptation because residents indicated that they suffered from water nuisance and heat stress. The outcome of the project is not only a clean soil, but also a new garage complex with green roofs and solar panels, driveways with water permeable grass tiles and infiltration crates, rainwater disconnected from the sewage system, redesign gardens with space for infiltration of rainwater and gardens facades. Many stakeholders have participated in the project Seringenstraat/Assendorp, each stakeholder and their role are described in the section below. In this project, the following participatory activities can be distinguished: collecting information, meetings, informing, designing and empowering. These are elaborated below, applying the five aspects of public participation, i.e., breadth, intensity, influence, openness and goals.

5.2.3.1. Participation in the project Seringenstraat

The municipality of Zwolle participated in the project in the first place because they are responsible for the contaminated soil. In a later stage they participated also to stimulate climate adaptation. They had a facilitating role and tried to support the residents to use their own knowledge and find solutions together. The municipality also connected residents to professionals in the network. Their role was thus facilitating, informing, cooperating and financing and were involved during the entire project. The neighbourhood manager of Assendorp participated in the project because he is the first contact for

the neighbourhood and regularly involved in projects within his working area. He has been involved during the whole project and contributed with the standard tasks of a neighbourhood manager but especially by suggesting the idea of garden facades. His role was to inform, consult and cooperate.

Residents participated because they lived on or near the contaminated soil. Some residents that did not live close to the contaminated soil also participated because they wanted to increase the quality of life in their neighbourhood by increasing green infrastructure. A small group of residents was the initiator of the project and had a managing role during the project. They organized the collaboration with other actors and participated in meetings. The other residents cooperated and participated in the construction of garden facades.

The Property Owners Association participated on behalf of the residents that were directly involved in the project because their property or backyard was contaminated or was adjacent to the construction site. They participated to ensure that the garage boxes were constructed in a sustainable way without high costs and an attractive look. They contributed to the project by participating in meetings, elaborating the construction plan, and organizing a group of volunteers for maintenance.

The developer participated because he wanted to redevelop the garage boxes. The developer was responsible for the execution of the redevelopment. He had to cooperate with the Property Owners Association and take their preferences into account in designing the garage boxes.

One of the neighbourhood members also participated in the project in his role as a garden designer. His personal goal is to increase green infrastructure in Assendorp, which is also his own neighbourhood. The municipality has asked him to participate and help with the design and construction of the garden facades. He only participated in this phase of the project. The Waterboard Drents Overijsselse Delta participated in the project through providing subsidies for the water storage solution. The waterboard provided this subsidy because it is their policy to financially support projects that limit the amount of water that ends up in the sewage system.

Most participants were not motivated by the municipality to participate, and this motivation came largely from themselves. Participation of the municipality and the neighborhood manager is self-evident because it is their responsibility. Residents had intrinsic motivation to participate because they wanted to increase the livability in their street, and the residents that live on the contaminated soil participated because they want to solve the pollution problem on their grounds. Other stakeholders were asked by the municipality and also had their own motivation to participate or grant subsidies.

5.2.3.2. Collecting information

One of the solutions to mitigate the problem of water nuisance, and the option chosen by the residents, was private water storage using water infiltration crates. The decision regarding which houses would get this water storage was made together with the residents. To calculate how much

and which type of crates were required for each household, including the associated costs, the municipality used the knowledge of experts both within as well as outside the municipal organization. The residents contributed with their own knowledge by providing information about their houses, roofs and backyards.

The breadth of this type of participation is moderate because only the residents that are directly-affected by the contaminated soil can participate. It is difficult to determine the level of intensity of this participatory activity because it is not known how many times information was collected via the residents. It can be assumed that this was a one-time event, implying that the intensity of this activity can be assessed as low. The participants do not have much influence, because they only provide information. Therefore, the influence remains at the lower level, i.e., 'inform'. The openness of participation is high, because the collection of information started in the planning phase, before the action-development phase. The goal of this type of participation is instrumental in nature because the collection of information will contribute to the quality of the project.

5.2.3.3. Meetings and conversations

Meetings and conversations took place during the entire project. In the preparation phase less frequent than in the implementation phase. These conversations mainly took place at the kitchen tables of the residents in Assendorp instead of at the municipality. The municipality chose explicitly for communicating via conversations at the kitchen table and through telephone contact because they wanted to propagate their sincere and good intentions. By having conversations at the kitchen table, an informal communication method, they promoted their facilitating role instead of a leading role. The municipality emphasizes that decisions regarding meetings were made in dialogue with the residents.

The meetings and conversations aimed at discussing the project with directly-affected residents in the neighbourhood. Not anyone who is interested can participate. Therefore, the breadth of this type of participation is moderate. The conversations took place during the entire process of the project, and thus from the start of the project: the pre-planning phase. The openness of this type of participation is thus high. Since these meetings took place multiple times during the project, the intensity is high. The meetings were informal of nature, and the municipality emphasized that they wanted to underscore their facilitating role, it can be assumed that the residents had much influence. The influence in this type of participation is therefore 'collaborate'. The goal of this type of participation is likely to be intrinsic because residents have the 'right' to determine what happens in their neighbourhood, street or even backyard and with these conversations, the municipality emphasizes this right.

5.2.3.4. Informing the neighbours

The project in the Seringenstraat took place for a couple of years. Neighbours that were not directly involved in the project did experience that it was ongoing. The neighbours that initiated the project were the persons who informed the neighbourhood about the status of the project. The municipality only informed the neighbourhood with an official letter regarding the soil remediation and the assigned contributions.

Since the residents themselves were the ones that managed communication to the other residents, the influence level of this participation can be seen as 'empower'. However, since the municipality also had to inform residents a couple of times, this is marked as a collaboration between residents and municipality. The breadth of this type of participation is moderate, because the communication is limited to neighbourhood residents. Since communication took place about the status of the project, it can be assumed that it started from the beginning, that is the pre-planning phase and lasted until the end of the project. This type of participation would thus have a high intensity. The goal is intrinsic because residents have the 'right' to be informed about what is going on in their neighbourhood.

5.2.3.5. Designing the backyards

For four households, their backyard had to be redesigned because of the soil remediation. Initially, several students were involved in designing these backyards, but that cooperation was stalled. The municipality then engaged a professional landscaper from the neighbourhood to design the gardens together with the residents. The gardens were thus recreated with a bit of help from the municipality, and the residents themselves.

In the process of designing the backyards, residents are, obviously, closely involved. Only the directly-affected public is allowed to participate. Therefore, the breadth of this participation activity is moderate. It is not known how many times the professionals and residents met to design the backyards, but it can be assumed that this was not a one-time event. The intensity is therefore probably high. The residents have much influence in the design, but they are not empowered to arrange the design themselves. This activity is therefore a collaboration between the municipality, professional garden designer and the residents. The design takes place in the planning phase of the project. The goal of this type of participation is both intrinsic as well as instrumental because the residents have the right to decide on their own backyards, and collaborating can also contribute to the goal of the municipality to retain more water.

5.2.3.6. Construction of garden facades

The neighborhood manager initiated the idea to plant garden facades in the Seringenstraat. He assumed that the residents would suffer from nuisance, because of the soil remediation and wanted to give something back to residents. The idea to plant garden facades was provided to the residents themselves, who were very enthusiastic.

From the view of the municipality, this activity is an example of empowering. The municipality came up with the idea, but they left its elaboration and implementation to the involved residents. It is an ad-hoc idea that originated in the implementation phase of another part of the project. The intensity of this participation activity is high, because multiple meetings were necessary to further develop the idea and execute it. Anyone that lived in the Assendorp neighborhood and was interested could participate in this activity. Since anyone interested was limited to a certain neighborhood, the breadth of participation is moderate. The goal of the activity is both intrinsic as well as instrumental. Intrinsic because the goal of the neighborhood manager was to make up for the nuisance, insinuating that this is something to be done according to social norms. Instrumental because the garden facades will provide the opportunity to retain more water and thus reduce the problem of water nuisance in the neighborhood.

5.2.3.7. Overview of the structure of participation per type of activity

Table 7 provides an overview of the different participatory activities that can be distinguished for the project Seringenstraat. They are elaborated in the previous sections applying the five aspects of public participation, i.e., breadth, intensity, influence, openness and goals.

Activity	Breadth	Intensity	Influence	Openness	Goals
Collecting information	Moderate	Low	Inform	Planning	Instrumental
Meetings	Moderate	High	Collaborate	Pre-planning	Both
Informing the neighbours	Moderate	High	Collaborate	Pre-planning	Intrinsic
Designing backyards	Moderate	High	Collaborate	Planning	Both
Garden facades	Moderate	High	Empower	Action development	both

Table 7: Structure of participation per type of activity in Zwolle

6. Use of and experiences with the self-assessment tool

Within the CATCH project, the partners have developed a benchmarking tool to assess the current position of partner cities with respect to the Water Sensitive Cities framework. The municipalities of Enschede and Zwolle have used the benchmarking tool and provided feedback in order to further develop the tool. The benchmarking tool is later renamed to the self-assessment tool. Through the CATCH+ project, the self-assessment tool is planned to be used by smaller municipalities in the province of Overijssel. Beforehand, it is necessary to assess whether the tool can be improved and how the contribution of the self-assessment tool to the implementation of risk dialogues for DPRA can be increased.

The first section contains a description of the self-assessment tool and provides general information about the tool and its indicators. The second section discusses the feedback from the municipalities during the development of the tool. The third section describes how the self-assessment tool is used and experienced by civil servants from Enschede and Zwolle. The contribution of the self-assessment tool to the implementation of risk dialogues is discussed in the next chapter.

6.1. Self-assessment tool

The self-assessment tool intents to provide a better understanding of 'the positioning and performance of each partner city with respect to the three principles of the Water Sensitive Cities (WSC) transition framework' (p.1) and identify opportunities for learning and knowledge exchange (CATCH, 2018). The tool is a benchmarking tool, and successful application of such a tool depends, according to Campbell (1994), on adequate selection of the important processes of an organization and, especially, a comprehensive understanding of the method. The goal of the tool is to identify major vulnerabilities in and ambitions of a city, and determine the position of the city on the WSC framework (CATCH, 2018). The self-assessment tool is to be used by civil servants from the municipality, as well as (nongovernmental) stakeholders.

The three pillars of WSC – 'cities as communities', 'cities as water catchments' and 'cities as ecosystem service providers' form the basis of the set of indicators. The WSC framework states that a city should have three characteristics that need to be integrated into the urban environment. These characteristics are: '1) access to a diversity of water sources underpinned by a diversity of centralized and decentralized infrastructure, 2) provision of ecosystem services for the built and natural environment, and 3) socio-political capital for sustainability and water sensitive behaviours' (Wong & Brown, p.4, 2008). The first attribute requires that cities use alternative water sources such as groundwater, water from rainfall, recycled wastewater, stormwater and desalinated water. The use of different types of water sources increases the cities flexibility and minimalizes the impact of losing a

source (Wong & Brown, 2008). The second attribute requires that communities should not draw on their depleting ecosystems and natural environments but instead improve them, by for example adding an ecosystem related function to public amenities. The last attribute stresses the importance of institutional capacity when sustainable urban water management needs to be advanced.

Starting from the original set of indicators of the WSC framework, the CATCH partners developed a tailor-made set of indicators for the midsize cities in North Sea Region. The resulting 20 indicators of the self-assessment tool should be scored on a scale from 1, the undesired level, to 5, the desired level. An overview of the indicators can be found in the table below. As shown in Table 8, the indicators are divided in three categories, following the three pillars of the WSC framework (CATCH+, 2018, p.13).

WSC pillar	Indicator title
Cities as communities	Organizational capacity (such as knowledge and skills) for climate adaptation at the city level
	Water as a key element in city planning and design/redesign
	City-level integrative arrangements across sectors (such as water, energy, traffic, housing, climate adaptation)
	Stakeholder participation in water and climate adaptation at the city level
	Leadership, long-term vision and commitment by the city-level administration
	Level of flood risk awareness of the population
	Organisation of emergency management
	Regulations to reduce potential flood damage in the city (for instance making green roofs or water storage compulsory for new buildings)
Cities as water catchments	Availability and use of both flood hazard and flood risk maps for areas at risk
	Areas to temporally store water in the city without expected damage (for instance at the surface, subsurface, green structures, etc.)
	Measures to increase infiltration (for instance through compensating for surface sealing and/or decreasing impervious areas)
	Status of infrastructure for water supply
	Maintenance of infrastructure for water supply
	Status of infrastructure for wastewater
	Maintenance of infrastructure for wastewater
	Status of infrastructure for flood protection
	Maintenance of infrastructure for flood protection
Cities as ecosystem service providers	Attention to the needs and protection of vulnerable groups (such as the elderly, children, and uneducated or unemployed citizens) against the negative impacts of climate change (such as floods and heatwaves)
	Healthy and biodiverse habitat
	Protection of surface water quality and flow regime
	Protection of groundwater quality and groundwater levels
	Activation of connected urban green and blue space
	Vegetation coverage at the city level

Table 8: Indicators of the self-assessment tool

6.2. Feedback during the development of the self-assessment tool

Several civil servants from the municipalities of Enschede and Zwolle have contributed to the development of the self-assessment tool. In February and March 2018th, the self-assessment tool, back then named benchmarking tool, was applied for the first time by the CATCH partners. Using the tool pointed out its strengths and weaknesses, several points of improvement, and missing indicators.

The strengths of the tool were, according to the civil servants, the fact that using the tool points out and raises awareness on the strengths and weaknesses within the municipality, and it raises questions on the quality of maintenance, involvement of stakeholders and citizens, and the completeness of data (CATCH+, 2018a). In Enschede, the tool provided insights in the progress in climate change adaptation because it points out the differences between the current situation and the situation five years ago (CATCH+, 2018a). The weaknesses of the tool are the fact that the tool is not tailored to the city, and the unclarity regarding the definition of terms such as 'good', 'sufficient' and 'all'. Additionally, several indicators were hard to score because the municipalities did not have the knowledge to judge them. These were indicators on water quality, clay ground, and polluted grounds (CATCH+, 2018a). The civil servants were missing indicators related to economics (for example: estate value, purchasing power, and damage control), water nuisance, and investors. After the feedback described above was processed in a new version of the tool, the municipalities used the tool again and provided new feedback. This mainly focused on the difficulty of scoring, understanding and judging indicators (CATCH+, 2018b). Additionally, Zwolle emphasized the ambiguity in terms such as 'sufficient', 'effective' and 'interdisciplinary' (CATCH+, 2018b).

From this feedback, we can draw three conclusions. Firstly, it can be concluded that the tool involved several indicators that were not relevant for Enschede or Zwolle. The cities of Enschede and Zwolle differ very much in characteristics. Enschede for example does not know a risk of flooding from the sea or big rivers. The cities would have preferred a tool that was tailor-made to the characteristics of the city, which would solve the problem of irrelevant indicators. Secondly, terms such as 'good', 'sufficient', 'all' and 'effective' lacked a proper explanation which left room for ambiguity. These terms need to be defined in detail so that there will be no differences in interpretation. And thirdly, some of the indicators are difficult to understand, and therefore it is hard for civil servants to judge and score the indicator. To resolve this, the indicators need to be described in more detail, so that they are easier to understand.

6.3. Feedback from Enschede after applying the self-assessment tool

Within the municipality of Enschede, a couple of civil servants in water management have used the self-assessment tool. Initially they filled in the tool individually, after which they discussed the results

with each other to determine the final scores. The functions of the civil servants differ from water designer, to policy advisor and city design engineer. They were selected to use the self-assessment tool because they were involved in the CATCH project for the municipality of Enschede. Most of the subjects in the tool were recognized by the municipality, since they have been intensively working on climate change adaptation for a while now. However, they found the use of the self-assessment tool difficult because there can be great differences in the interpretation of the questions. They provide the example that one of the colleagues that filled in the self-assessment looks at the questions from an abstract perspective, while another from the practical perspective. This difference caused, inevitably, different scores for the questions and therefore a discussion among colleagues. Although this was marked as a negative aspect by the municipality, it can be seen as a positive aspect as well, since discussions among colleagues will provide substantiated scores that are probably more accurate.

Using the self-assessment tool provided insights in the position of Enschede regarding climate change adaptation. The results point out the subjects that are going well, but also subjects that have opportunities for improvement. City-level integrative arrangements for example, is a subject on which Enschede has scored well in 2018, but such arrangements did not exist a couple of years ago. It thus makes you realize the progress you have already made. The organization of emergency management, on the other hand, was scored less good and therefore triggered the municipality to take action. Based on the results of the SAT, which showed that Enschede did not score well on the organization of emergency management, the decision has been made to pay more attention to this subject and action has been initiated, both inside and outside the municipal organization to improve on this subject.

Besides positive aspects, the municipality also emphasized four less positive aspects of the self-assessment tool. Firstly, when the municipality used the tool, it was not very user-friendly and therefore more difficult to fill in. As previously mentioned, there is room for different interpretations and some of the indicators were unclear. Secondly, the third category of the self-assessment tool – regarding ecology and green/blue space, was more difficult to score because the indicators were harder to understand. This was because the term was less exact and therefore hard to classify, but also because the municipality had not worked as extensively on that subject as on the other two. Thirdly, the municipality has seen many benchmarks in the past years. Using such a tool requires time and attention and civil servants are very busy with their regular work. Their initial reaction to the request to use the tool was therefore rather negative. The more benchmarks or self-assessment tools they have to use, the less enthusiastic they are. It is thus important that such a tool is easy to use and thus requires little time to fill in. There should also be clarity on why the tool has to be used, so civil servants are motivated to do so. And fourthly, the subject of drought is missing in the self-assessment tool. Since the city of Enschede has experienced serious droughts in 2018, and the fact that it is one of the

risks from climate change, this subject would complement the tool and was missed by the civil servants.

The civil servants in Enschede believe that the self-assessment tool has an added value in implementing the DPRA because using to tool increases awareness and initiates the discussion regarding the risks, strengths and weakness related to climate change. The tool can be used to get insights in the position of the city regarding the subjects of the tool. It shows the subjects you score well on, but also the subjects you should pay extra attention to. It increases the awareness within the municipality on these subjects. The DPRA has much to do with raising and increasing awareness on the risks of climate change and the strengths and weaknesses in a city.

6.4. Feedback from Zwolle after applying the self-assessment tool

In Zwolle, two civil servants have used the self-assessment tool. Both civil servants are policy advisors in the subjects of water and climate change adaptation. They were selected to use the self-assessment tool because they were involved in the CATCH project for the municipality of Zwolle. In general, they found the use of the self-assessment tool difficult because the intention of the tool was unclear and there was no clarification of terms. The output of the tool is not used for further policy making because it did not provide any new insights. The civil servants from Zwolle believe that the self-assessment tool would have an added value for municipalities in which climate change adaptation is a new subject and there is a need for insights in strengths and weaknesses. They did not find the tool useful for Zwolle, since the city has been involved in climate change adaptation for some time now and did have knowledge on risks, strengths and weaknesses. The civil servants also doubt whether the tool can be useful for implementing risk dialogues, but they tend to think not since the tool did not provide any new insights.

The tool was also seen as difficult to use because it was unclear whether the tool was a benchmark to compare the city to other cities or a self-assessment to gain insights in the current situation in the city. It was said to be a benchmark but looked like a self-assessment which caused uncertainty. The civil servants emphasize that it was difficult to give a score because they had no clear definition or description of terms such as ‘sufficient’, ‘good’, and ‘all’. Giving a score thus depended to a great extent on interpretation.

The municipality mentioned two negative aspects. The first aspect is that the tool is not tailor-made for the city of Zwolle, and that some of the subjects within the tool were not relevant for the city of Zwolle. The second aspect is that the civil servants doubt whether there would be any difference in the scores if they would use the tool again in two years. Even though they have many projects regarding climate change adaptation, they believe that these projects will not cause a change in the

score that will be given. It is thus questioned whether the tool sufficiently shows the impact of climate change adaptation policies.

Only one positive aspect is mentioned, namely that using the self-assessment tool changed the insights on the subject of vulnerable groups in society. The municipality had not yet realized that vulnerable groups such as disabled persons may require a different approach when mitigating the risks of climate change.

6.5. Conclusion

The self-assessment tool was used by multiple civil servants in Enschede and Zwolle that are already involved in CATCH. The functions of these civil servants differ, but they are all involved in water management and climate change adaptation. Using the tool was generally judged as difficult because of unclarity in definitions and referencing. In both cities, it has provided insights in one subject that did not receive enough attention previously. For Enschede, this was emergency management and for Zwolle, it was the vulnerable groups in society. In Enschede, action was initiated to improve the current situation on this subject. The civil servants were missing indicators regarding economics and droughts. Enschede beliefs that the self-assessment tool has an added value in implementing the DPRA because using to tool increases awareness and initiates the discussion regarding the risks, strengths and weakness related to climate change and DPRA has much to do with this. However, Zwolle disagrees because the tool did not provide any new insights regarding their situation. They do think that the tool is useful for municipalities in which climate change adaptation is a new subject and there is a need for insights in strengths and weaknesses. The positive and negative aspects are summarized in Table 9 on the next page.

Ease of use	+/-
Some indicators are difficult to understand, and therefore hard to score.	-
The more benchmarks or self-assessment tools you have to used, the less motivated or enthusiastic you are.	-
Completeness	
The subject drought is missing in the self-assessment tool.	-
It is questioned whether the tool sufficiently shows the impact of climate change adaptation policies.	-
Clarity	
It points out and raises awareness on the strengths and weaknesses	+
Terms such as good, sufficient, all and effective lacked a proper explanation which left room for ambiguity.	-
Relevance	
It raises questions on the quality of maintenance, involvement of stakeholders and citizens, and the completeness of data	+
It points out the differences between the current situation and the situation five years	+
The tool involved several indicators that were not relevant for Enschede or Zwolle.	-

Table 9: Overview of feedback on self-assessment tool

7. Conclusions and recommendations

The main research question of this thesis is as follows: How can the self-assessment tool be used in order to improve public participation in risk dialogues within the context the DPRA? In order to answer this main research question and formulate recommendations, a number of sub-questions need to be answered. These sub-questions are formulated as follows:

1. What participatory mechanisms have the cities of Enschede and Zwolle followed thus far to implement risk dialogues?
2. How is the self-assessment tool used and experienced by civil servants of Enschede and Zwolle?
3. To what extent does the self-assessment tool have an added value on the implementation of risk dialogues within the context of the DPRA?
4. How can the contribution of the self-assessment tool to the implementation of risk dialogues be increased (for smaller municipalities)?

The first three sub-questions are answered in the Conclusions section below, followed by the answering of the main research question. An answer to the last sub-question is provided in the Recommendations section.

7.1. Conclusions

7.1.1. Participatory mechanisms in Enschede and Zwolle

Enschede and Zwolle have used several different participatory mechanisms related to the implementation of the first two ambitions of the DPRA, i.e., 1) identifying the vulnerabilities and 2) conducting a risk dialogue.

Six participatory mechanisms can be distinguished in Enschede, of which one mechanism is used in the development of a method, and five at the Stadsbeek project level. In Enschede, risks are classified through a 'risk-based water management' method. Calculations and models provided insights in vulnerable areas in the city, of which Stadsveld was one. Experts have participated in the development of this method by providing knowledge and expertise. Several departments within the municipality, such as Urban Development and Living Environment involving different disciplines such as transport and landscape planning, and different organizations outside the municipality that are involved in water management or water related risks, such as RIONED, STOWA and the GGD, have contributed to the development of the risk-based water management method.

In the Stadsbeek project, five participatory mechanisms can be distinguished. The first mechanism, which is collecting information from the public members, was used before the official start

of the project to collect data from directly affected public to determine the scope of the problem. The participants did not have much influence, because they only had the opportunity to provide information. The second type of participatory mechanism is informing and engaging the public. The municipality used newsletters to inform both directly affected public, as well as anyone who was interested during the entire duration of the project. Newsletters were also used to engage the public, because they were also invited to participate in other activities, such as designing the area and other informative meetings. This mechanism was also informative in nature, and therefore the participants did not have much influence. The third type of participation is co-designing the area. Through the newsletter, the public was invited to participate in designing sessions, in which they had the opportunity to decide on the design of the Stadsbeek. Although invitations were distributed through the newsletter, only the directly affected public had the opportunity to participate. The fourth type of participation consists of empowering other initiatives. Anyone who was interested was invited to come up with other ideas to improve the neighbourhood. Participants thus had much influence on the outcome. The fifth and last type of participation is involving stakeholders, i.e. private or public organisations in the policy process. The municipality gave attention to affected stakeholders by visiting, informing and collaborating with them. Examples are collaboration with the high school and combining a schoolyard make-over with water retainment.

In Zwolle, official risk dialogues have not yet taken place. However, the municipality does use opportunities to improve climate resilience. The municipality implements participation at the project level, and organizes participation and cooperation between different stakeholders in a pilot project. Climate change risks are identified through maps, stress tests, calculation models and complaints. The policy plans of the municipality clearly show that the focus of the municipality is on facilitating initiatives from citizens. Not all citizen projects can be supported, but the municipality does not have a methodology for choosing between multiple projects. There are some criteria that are used to determine which projects are supported, with a preference for a proportional distribution of good example projects. In a pilot project, aimed at stakeholder participation, the municipality distinguishes three types of stakeholders. The first type of stakeholder is citizens, the second is the professional community and the third is the governmental organisations and the delta partnership level. The municipality functions as a linking pin, and aims at connecting the different types of stakeholders and stimulating cooperation. One of the citizen initiatives is the Seringenstraat/Assendorp project, in which five types of participation can be distinguished.

The first type of participation in the Seringenstraat/Assendorp project is collecting information. The participants are the directly affected public whom had the opportunity to provide information, and thus did not have much influence. The participatory mechanism took place at the beginning of the project and had an instrumental goal. The second type of participation is meetings

and conversations, which took place during the entire project. The activities were aimed at informing the directly affected public about the status of the project but also provide them with the opportunity to initiate action. Participants thus had some influence and the opportunity to collaborate with the municipality. The third type of participation is informing the directly affected public, which was actually done by the residents themselves. This type of participation is therefore empowering, and it started at the beginning of project. The fourth type of participatory mechanism is co-designing the backyards. The municipality collaborated with the directly affected public, that is the residents, and professionals. The fifth and last type of participation is empowering the construction of the garden facades. Citizens organized to construct garden facades for anyone in the neighbourhood who was interested.

It can be concluded that both cities have used several participatory mechanisms. However, in the first two steps of the Delta Program on Spatial Adaptation, which are identifying the vulnerabilities and conducting a risk dialogue, they have to a lesser extent or not at all used participatory mechanisms. Vulnerabilities are identified by using calculations and models, and the risk dialogue is in Enschede executed by the municipal council, and in Zwolle, currently only plans are being made to conduct the risk dialogue. In Enschede, professionals did participate in developing the method of identifying vulnerabilities, and the municipality of Zwolle pays attention to involving stakeholders and connecting them to each other. Participation from the public happens in both cities extensively at the project level, after the vulnerabilities and the acceptable risks have already been identified.

7.1.2. Use of and experience with the self-assessment tool

The self-assessment tool was used by multiple civil servants in Enschede and Zwolle, who are involved in the CATCH project. The functions of these civil servants differ, but they are all involved in water management and climate change adaptation. Using the tool was generally judged as difficult because of unclarity in definitions and referencing. In both cities, it has provided insights in one subject that did not receive enough attention previously. For Enschede, this was emergency management and for Zwolle, it was the vulnerable groups in society. In Enschede, action was initiated to improve the current situation on this subject. The civil servants were missing indicators regarding economics and droughts. Respondents from Enschede believe that the self-assessment tool has an added value in implementing the DPRA, because using to tool increases awareness and initiates the discussion regarding the risks, strengths and weakness related to climate change, and the DPRA has much to do with these issues. However, the respondents from Zwolle disagree, because they argue that the tool did not provide any new insights regarding their situation. They do think that the tool is useful for municipalities in which climate change adaptation is a new subject and there is a need for insights in strengths and weaknesses.

Ease of use	+/-
Some indicators are difficult to understand, and therefore hard to score.	-
The more benchmarks or self-assessment tools you have to used, the less motivated or enthusiastic you are.	-
Completeness	
The subject drought is missing in the self-assessment tool.	-
It is questioned whether the tool sufficiently shows the impact of climate change adaptation policies.	-
Clarity	
It points out and raises awareness on the strengths and weaknesses	+
Terms such as good, sufficient, all and effective lacked a proper explanation which left room for ambiguity.	-
Relevance	
It raises questions on the quality of maintenance, involvement of stakeholders and citizens, and the completeness of data	+
It points out the differences between the current situation and the situation five years	+
The tool involved several indicators that were not relevant for Enschede or Zwolle.	-

Table 10: Positive and negative aspects of the self-assessment tool

7.2. Added value of the self-assessment tool

The self-assessment tool is a tool to gain insights in vulnerabilities or resilience. Many similar tools can be found in scientific literature. By comparing the self-assessment tool to these tools, the requirements from the DPRA and the stress test, an effort is made to determine the added value of the tool in the implementation of the DPRA. The tools that are used for this comparison are the Climate Disaster Resilience Index, the Coastal City Flood Vulnerability Index, the Multi-Dimensional Urban Vulnerability Assessment, Disaster Resilience of Place model and the Method for the Improvement of Vulnerability Assessment in Europe. The comparison of these methods has provided insights in the aspects that should be included in vulnerability or resilience assessment. In addition, it was researched what requirements for a risk dialogue exist and what is included in the stress test. The comparison with the stress test is on content, with the related tools on the design and the risk dialogue on the outcome. The stress test is compared on content because it serves the same goal, namely to gain insights in vulnerabilities for the risk dialogue, and therefore is expected to require a similar content. The comparison of the related tools provides insights in different designs and the consequences of choosing a specific design. The comparison with the goals of the risk dialogue is based on outcome,

because the goal of examining the self-assessment tool is to determine how it can (better) contribute to the implementation of risk dialogues.

The term risk dialogue is not elaborated in the DPRA but criteria are provided by research. The second criterion is relevant for the input for the dialogue and states that the dialogue should be held based on information about the effects of climate change. The DPRA does not provide a clear description of what data is necessary, but it can be assumed that enough data should be used regarding the risks and effects of climate extremes. This open description of the requirements indicates that using the self-assessment tool does have an added value on the implementation of risk dialogues because the outcome of the tool is data on the sensitivity and thus resilience of a city regarding water (nuisance). Although it does not show the actual risks, it allows to estimate the possible effects of climate extremes. The stress test does show the actual risk. This test increases the awareness of the effects of climate change and provides a general overview of the vulnerabilities of an area. The result of the test is insights in the risks and effects of water nuisance, heat stress, droughts and floods.

The comparison of the related tools shows that the level of analysis depends on the goal of the assessment. If the goal is to identify the vulnerability or resilience of a city as a whole, it is only necessary to analyse the city level. If the goal is to make a decision on distributing attention or resources within the city, it is necessary to analyse multiple neighbourhoods and compare the results. The tools generally include five dimensions of vulnerability or resilience, namely: natural/ecological, physical/infrastructure, economic, social and institutional. Most tools pay attention to multiple, more detailed, characteristics of the concept of resilience, that are vulnerability, exposure and susceptibility. The indicators that are used in the assessment take aspects into account that negatively, but also positively influence vulnerability or resilience. Furthermore, the difficulty of using the tools differs to a great extent. The level of difficulty is decreased when indicators and calculations are already determined, and when a scoring system is already developed. The design of the self-assessment tool has many similarities with other related tools from scientific literature. In Table 11 on the next page, an overview is provided of the differences and similarities between the self-assessment tool, related tools and the stress test. The use of the self-assessment tool does have an added value on the implementation of risk dialogues. The results of the tool can be used as input for the risk dialogue. However, the data from the self-assessment tool alone will not be sufficient, since it does not provide insights in the actual risks. It does provide insights in the strengths and weaknesses of a city, and thus allows to estimate the possible effects of climate extremes.

Aspect of tool	Related tools	Stress test	SAT
Level of analysis			
City level	X		X
Neighbourhood level	X	X	
Dimensions			
Natural/ecological	X	X	X
Physical/infrastructure	X	X	X
Economic	X		
Social	X		X
Institutional	X		X
Fundamental characteristics of vulnerability or resilience			
Exposure	X		
Susceptibility	X		X
Takes negative influences into account	X		X
Takes positive influences into account	X	X	X
Already determined indicators and calculations	X		X
Scoring system for indicators	X		X

Table 11: Overview of differences and similarities in tools

7.3. Recommendations

The contribution of the self-assessment tool to the implementation of risk dialogues can be increased by complementing the tool with the elements that are missing and the points of improvement according to practitioners and based on the comparison with related tools.

The comparison with related resilience or vulnerability assessment tool points out that only two elements are missing, namely the economic dimension and attention to exposure. The economic dimension can focus, for example, on possible damage to buildings or working continuity. Exposure can be brought under attention by estimating the elements in an area in which hazards may occur. The civil servants in the cities Enschede and Zwolle that used the self-assessment tool also provided points of improvement and missing elements. The respondents were missing indicators regarding economics and droughts. It was also emphasized that definitions were missing of terms such as 'good' and 'effective' and that it was hard to score the subjects because a reference was missing. The respondents also pointed out that some indicators were not relevant for their city, and it would be better if the tool would be tailor made to the city.

To conclude, the following points of improvement arise:

1) Add an economic dimension that entails financial effects of climate extremes
2) Pay attention to exposure
3) Provide clarity regarding definitions of terms such as ‘good’ and ‘effective’.
4) Describe a frame of reference for scoring.
5) Increase relevance by tailoring the tool to the city.
6) Focus on other climate extremes as well, such as droughts.

7.4. Use of research results

The results of this research can be used by the CATCH+ project to redesign the self-assessment tool, which can then be used in order to advise and support smaller municipalities in the province of Overijssel. Furthermore, the results regarding public participation can be used by the municipalities of Enschede and Zwolle to learn from and get inspired by each other. Smaller municipalities can use the results to design the implementation of risk dialogues and the participation activities.

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Appendices

1) Interview Guide

Interview gids

Introductie

- Introductie door interviewers: Franziska, Susan and Sophie
- Noteer gegevens
- Beschrijf doel van de onderzoeken
- Beschrijf de interviewprocedure
    - Duur: ongeveer een uur
    - Open vragen
    - Interview wordt opgenomen en er worden notities gemaakt
    - Geïnterviewde heeft de mogelijkheid om vragen te stellen

Vragen

1. Introductie interviewee

- Rol in klimaatadaptatie, de risicodialoog en in de ontwikkeling en gebruik van SAT.

2. Klimaatadaptatie en de risicodialoog

1. Kunt u omschrijven wat er de afgelopen jaren is gebeurd in uw stad in het kader van ruimtelijke adaptatie?
2. Kunt u omschrijven wat er de afgelopen jaren is gebeurd op provincie en nationale niveau in het kader van ruimtelijke adaptatie en hoe dit uw activiteiten heeft beïnvloed?
3. Wat verstaat u onder een risicodialoog en in welke vormen heeft deze risicodialoog plaatsgevonden of is deze voor de komende tijd gepland?
4. Heeft u zulke activiteiten georganiseerd of heeft u aan zulke activiteiten in Enschede of in de provincie geparticipeerd? (Als het alleen geparticipeerd is, waarschijnlijk niet alle vragen 5 mogelijk.)
5. Kunt u iets vertellen over de activiteiten die georganiseerd zijn gerelateerd aan risicodialogen?
    a. Welke activiteiten zijn al georganiseerd in het kader van risicodialogen?
    b. Waarom zijn deze activiteiten georganiseerd? En door wie?
    c. Wanneer zijn deze activiteiten georganiseerd?
    d. Wat zijn de (verwachte) uitkomsten?
    e. Hoe zijn de uitkomsten van deze activiteiten beoordeeld?

3. Participatie (welke participatie mechanismen hebben Enschede en Zwolle tot dusver gebruikt bij het implementeren van risicodialogen?)

Participatie verwijst naar het betrekken van een actor in het maken van beleid. Participatie mechanismen zijn methoden om deze participatie te realiseren, bijvoorbeeld door het organiseren van informatieavonden.

1. Wat voor participatie activiteiten/werkvormen zijn georganiseerd gerelateerd aan de risicodialogen? (bijvoorbeeld: bijeenkomst, workshop, excursie, werkgroep, interview)
    a. Wanneer hebben deze plaatsgevonden?

   b. Hoe is hiervoor gekozen?
   c. Wie beslist hierover?
2. Kunt u wat vertellen over de deelnemers van de risicodialogen?
   a. Wie participeert in deze activiteiten (bijvoorbeeld: professionals (intern/extern), direct betrokken organisaties/personen, iedereen die wilt participeren)
   b. Waarom participeren deze personen?
   c. Wanneer hebben zij deelgenomen?
   d. Hoe worden deelnemers gemotiveerd om deel te nemen? (bijvoorbeeld door financiële incentives)
   e. Hoe en wat hebben de deelnemers bijgedragen aan het proces (bijvoorbeeld informatie, raad, samenwerken)?
   f. Hoeveel invloed hebben deze deelnemers op de resultaten? (bijvoorbeeld, informeren, raadplegen, samenwerken of zelfsturing)
3. Uitkomsten
   a. Wat zijn de resultaten van de participatie activiteiten?
   b. Hoe worden de resultaten gebruikt?

4. Self-assessment tool (benchmarking tool)

De self-assessment tool, ontwikkeld door CATCH, is gebruikt als zelfevaluatie en toont de positionering en prestaties van een stad met betrekking tot de drie principes van Water Sensitive Cities. In dit onderzoek wordt gekeken naar de toegevoegde waarde van deze tool bij de implementatie van het DPRA.

1. Kunt u wat vertellen over uw ervaringen met het ontwikkeling en het gebruik van de self-assessment tool?
   a. Wie heeft de self-assessment tool gebruikt?
   b. Waarom hebben zij de tool gebruikt?
   c. Hoe worden de uitkomsten van de tool gebruikt in verdere beleidsvorming?
   d. Welke indruk heeft u van de self-assessment tool en zijn gebruik?
   e. Welke verwachtingen had u van de tool en zijn deze waar gemaakt?
2. Wat vind je van de tool?
   a. Zijn er aspecten of dimensies die missen in de tool?
   b. Wat is positief aan de tool?
   c. Wat is minder positief aan de tool?
3. Zijn de uitkomsten van de tool ergens voor gebruikt? En zo ja voor wat?
   a. Past de self-assessment tool binnen het DPRA proces? En waarom wel/niet?
   b. Heeft het gebruik van de tool bijgedragen aan het implementeren van de risicodialogen?

Afsluiting

- Zijn er nog aanvullingen?
- Mag er contact opgenomen worden per mail als er nog verdere vragen zijn?
- Kunnen jullie relevante documenten sturen?
- Is het mogelijk om een vervolg interview te plannen?
- Bedankt voor de tijd.

2) Consent Form

Toestemmingsverklaringsformulier

Onderzoek: Participation and resilience in climate change adaptation

Onderzoeker: Sophie Groeneveld, Franziska Baack, Susan Groenia

Hierbij verklaar ik dat ik het informatieblad van het onderzoek heb gelezen en begrepen en ik ben akkoord met de punten benoemd in dit informatieblad. Ik ben in staat gesteld om vragen te stellen over het onderzoek, en mijn vragen zijn beantwoord tot mijn tevredenheid. Ik stem vrijwillig in met deelname aan dit onderzoek en begrijp dat ik mag weigeren antwoord te geven op vragen en me kan terugtrekken als deelnemer op elk moment van het onderzoek.

Voor het registreren van data mag de volgende persoonlijke informatie gebruikt worden:

- ☐ Naam
- ☐ Functie
- ☐ Organisatie

Voor het refereren naar data mag de volgende persoonlijke informatie gebruikt worden:

- ☐ Naam
- ☐ Functie
- ☐ Organisatie

Deelnemer		**Onderzoeker**	
Naam:		Naam:	
Datum:		Datum:	
Handtekening		*Handtekening*	

3) Information Sheet

Informatieblad

Doel van het onderzoek

Dit onderzoek streeft er naar om inzicht te krijgen in de implementatie van het Delta Plan Ruimtelijke Adaptatie in Enschede en Zwolle om de (toekomstige) implementatie in (andere) steden in Overijssel te bevorderen. Daarbij ligt de focus op stakeholderparticipatie en de zelfbeoordelingstool van CATCH. Om hierin inzicht te krijgen zullen de participatiemechanismen die de steden Enschede en Zwolle hebben gebruikt worden beschreven aan de hand van een theoretisch kader. Daarnaast zal het gebruik van en de ervaringen met de zelfbeoordelingstool worden onderzocht om te bepalen wat de toegevoegde waarde van deze tool in het implementatieproces van risicodialogen is.

Het onderzoek kan voor de te interviewen personen geen ongemak of risico's met zich meebrengen, omdat zij enkel input leveren over hun ervaringen met de zelfbeoordelingstool en participatie van belanghebbenden in de implementatie van DPRA. De commissie ethiek van de faculteit gedragswetenschappen heeft dit onderzoek beoordeeld en goedgekeurd.

Mogelijkheid tot terugtrekking

Mocht de deelnemer gedurende het onderzoek zich willen terugtrekken is dit mogelijk. Indien deelname ook niet anoniem voortgezet mag worden, kan de deelnemer contact opnemen met Sophie Groeneveld om de deelname te beëindigen en de gegevens en informatie te wissen.

Gebruik van (persoonlijke) informatie

Persoonlijke informatie – dat is naam, functie, organisatie – zal aan het begin van het interview gevraagd worden aan de deelnemer. De deelnemer moet in het toestemmingsverklaringsformulier aangeven wat er met deze persoonlijke informatie gedaan mag worden zowel voor het registreren van de data (intern) als de bronvermelding bij de data (extern). Daarbij kan de deelnemer kiezen uit:

1. Organisatie
2. Functie en organisatie
3. Zowel naam, functie als organisatie

De deelnemer heeft het recht om deze keuze te wijzigen gedurende het hele onderzoek.

Tijdens de interviews zal de informatie die de deelnemer verstrekt genoteerd worden, daarnaast wordt een opname gemaakt van het interview zodat zeker is dat alle informatie beschikbaar is. De informatie die voortvloeit uit de interviews zal worden opgeslagen en gedeeld met betrokken onderzoekers (Franziska Baack en Susan Groenen) via een online platform dat beveiligd is. Er wordt dus vertrouwelijk met de informatie omgegaan. De informatie die uit het interview wordt gehaald en gebruikt wordt in de thesis zal tijdens het proces nog opgestuurd worden naar de deelnemers, met het verzoek om akkoord te geven. De deelnemers hebben dan de mogelijkheid om de informatie aan te passen en/of te wissen.

Planning onderzoek

De informatie die verkregen wordt voor dit onderzoek zal beschikbaar blijven voor het CATCH project. Mocht een deelnemer hier bezwaar tegen hebben, zal de informatie afkomstig van de betreffende deelnemer gewist worden na voltooiing en goedkeuring van het onderzoek.

Contactgegevens

Verantwoordelijke onderzoeker: Sophie Groeneveld, s.f.f.groeneveld@student.utwente.nl
Begeleider: Gül Özerol, g.ozerol@utwente.nl
Commissie Ethiek: ethicscommittee-bms@utwente.nl (kan gebruikt worden voor klachten)