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Institutional capacity building towards flood resilience Zwolle as a water sensitive city

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Abstract

In order to move towards resilience approaches a rise in awareness and a change in mindsets from both public and private stakeholders is demanded. In other words, to make the shift towards flood resilience, it is needed to build intellectual, social and political capital. To build social and political capital, is however one of the biggest challenges of this shift towards flood resilience. Especially midsize cities face a lack of expertise and funding. In this research the case Zwolle is put central. Zwolle is a fast-growing city, situated in the IJssel Vechtdelta in the Netherlands and has a very vulnerable position. Moreover, Zwolle is part of the Interreg CATCH project and aims to become a water sensitive city. The aim of this study is to learn how midsize cities can build institutional capacity in order to accelerate the transition to flood resilience. Based on this research several recommendations for institutional capacity building in Zwolle are made, such as: include and activate private stakeholders and invest in a new type of civil servants.

Keywords: institutional capacity building; water governance; urban flood resilience; water sensitive city; midsize cities

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List of Abbreviations

KNMI	Koninklijk Nederlands Meteorologisch Instituut
DPRA	Deltaplan Ruimtelijke Adaptatie
ZAS	Zwolse Adaptatiestrategie

Chapter 1: Introduction

1.1 Background

Global climate change, extreme weather events and sea level rise put an increasing pressure on the deltaic and coastal regions of today (van der Voorn et al., 2017). ‘Population growth, economic growth, urbanisation and in some cases also soil subsidence exacerbate these potential consequences’ (Hegger et al., 2014, p. 4128). Regardless of these projections, flood-prone areas are still continuously developing which further increases flood risk (Wiering et al., 2017). According to Allan et al. (2013, p. 625) ‘climate change is likely to alter the availability and distribution of freshwater (and alter the impacts of water related disasters such as floods and droughts), while simultaneously increasing the demand for water from rivers and impacting on groundwater availability’. As stated in the Deltaprogramma 2018, nuisance caused by heavy rainfall can already be observed more often in the Netherlands. Extreme precipitation events will occur even more often in the future compared to current events, based on the KNMI ’14 climate scenarios even up to five times as often in 2050 and up to ten times as often in 2085 (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). Flooding and landslips are the most commonly occurring natural hazards in Europe, and they account for the most casualties and largest amount of economic loss (Hegger et al., 2014). Such extreme events have already proved to cause major economic damage in the Netherlands as well. If nothing changes, the damage caused by heat, drought and flooding in urban areas can amount to around € 70 billion in the period up to 2050 (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017).

Therefore, water security has become a key policy area today (Allan et al., 2013). United Nations Water (2013, p. 6) uses the following definition for water security: ‘the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability’. In this regard, it seems that measures which have been proven to be successful in the past are no longer suitable for present and future challenges. Pahl-Wostl et al. (2011, p. 838) therefore conclude that ‘the extent of innovation required to successfully address contemporary water management challenges requires a paradigm shift’. Traditionally the paradigm in Dutch water management was predominantly focused on fighting against the water. The focus on the capacity to resist, instead of the capacity to absorb and recover or the capacity to adapt and transform, is also very much institutionalized in the Netherlands (Driessen et al., 2018). To increase resilience the flood risk management measures should be diversified and shift more towards adaptability and transformability (Driessen et al., 2018; Restemeyer et al., 2015). In the 1990s the Dutch flood defense strategy was broadened by means of the Room for the River projects (Driessen et al., 2018). More recently, flood risk mitigation and adaptation

seem to become more prominent in policy making dialogue and experiments with corresponding measures have started (Driessen et al., 2018).

Liao (2014) describes this transition that water management is going through as the switch from resistance to resilience. 'A transition is a long-term process (25– 50 years) resulting from a co-evolution of cultural, institutional, economical, ecological and technological processes and developments on various scale levels' (van der Brugge et al., 2005, p.165-166). During this process, various events occur on multiple scale levels in different realms which all reinforce one another. This reinforcement causes the system to move to different somewhat stable states (van der Brugge et al., 2005). Van der Brugge et al. (2005) illustrate this move by an S-shaped curve. According to this S-shaped curve a transition includes four phases: pre-development, take-off, acceleration and stabilization (van der Brugge et al., 2005).

In order to further safeguard water security in the Netherlands, the second Deltaprogramme has been developed. The second Deltaprogramme creates a general guideline to secure flood safety and an adequate quantity of freshwater up until 2050 (van der Voorn et al., 2017). The second Deltaprogramme was established based on the advice of the second Delta Committee, commissie Veerman. Its' predecessor, the first Delta Committee, was installed after the disastrous storm surge in 1953 and is known for the famous Delta Works (Verduijn et al., 2012). The Dutch second Deltaprogramme 2012 is based on the concept of resilience and aims for a balance between protection, prevention and preparedness (Zevenbergen et al., 2012). The adoption of the adaptive delta management concept in the Deltaprogramme indicates a shift from traditional technocratic water management towards a more adaptive approach (van der Voorn et al., 2017). However, the partners in the second Deltaprogramme soon realized that the existing way of working did not create sufficient progress with spatial adaptation. Therefore, the Deltaplan Ruimtelijke Adaptatie (hereafter DPRA), became part of the yearly Deltaprogramme as of 2018 (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken 2017). The DPRA is a plan formulated by municipalities, waterboards, provinces and the national government together, to make the Netherlands climate-proof and water robust (Kennisportaal Ruimtelijke Adaptatie, n.d.).

'Frequently used terms such as 'climate resilient,' 'climate-proofing,' and the 'resilient city' emphasize the idea that cities, urban systems, and urban constituencies need to be able to quickly bounce back from climate related shocks and stresses' (Leichenko, 2011, p.164). For cities it is often posed as the main goal to strive for resilience and to introduce adaptation as well as mitigation measures (Leichenko, 2011). In the Netherlands, large cities such as Rotterdam and The Hague, who are part of the Global Resilient Cities Network, are frontrunners to become climate resilient (Resilient Rotterdam, n.d.; Resilient the Hague, 2020). For smaller, mid-size cities it is often more challenging to become climate

resilient as they are less likely to be involved in networks and research programs compared to large cities (Özerol et al., 2020). Zwolle is an interesting case as it is also very active in the field of climate adaptation and part of an European project called CATCH (water sensitive Cities: the Answer To CHallenges of extreme weather events) (Interreg North Sea Region, n.d.).

1.2 Problem definition

According to van der Brugge et al. (2005), the transition away from the traditional technocratic approach in Dutch water management was already in the take-off phase. However, it is not certain whether this transition will be successful due to the complications with implementation of new processes and tools (van der Brugge et al., 2005). ‘As long as there are severe incompatibilities between the strategic level and the operational level, the point of irreversibility will not yet be reached, meaning that the transition still can get stuck in a lock-in or lock-out’ (van der Brugge et al., 2005, p.173). The mid-term evaluation of the DPRA shows similar issues. In the evaluation it says that implementation has started off well, but it also says that the current approach does not stimulate the parties enough to ensure spatial adaptation as an integral part of policy and implementation from 2020 onwards (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). While it is often considered essential to change flood risk strategies and their institutional setting in view of climate change, little is known about the conditions that allow for policy change to actually occur (Wiering et al., 2017). The main problem is thus that it remains difficult to make adaptation measures an integral part of flood risk management which impedes the transition to a more resilient approach. What makes adoption of these adaptive measures challenging, are the many uncertainties and the complexity of climate change related issues (van der Voorn et al., 2017). According to Schoeman et al. (2014), there are a multiple institutional barriers as to why traditional water management is inadequate to deal with complex issues, such as: a sectoral approach to work, limited stakeholder engagement, inflexibility in institutions and ‘presumption of stationary (predictable uncertainty)’ (Schoeman et al., 2014, p.385). While adaptive approaches are based on the assumption that complex systems will ultimately evolve differently than expected (Bloemen et al., 2019). ‘Therefore, anticipation of effective policy relies on the pre-designed ability to deal with changing conditions or sudden shocks’ (Bloemen et al., 2019, p.61).

1.3 Research objectives and questions

The aim of this research is to learn how midsize cities can build institutional capacity in order to accelerate the transition to urban flood resilience and to see what lessons can be learned from a frontrunner like Zwolle. Therefore, the main research question is:

How can midsize cities build institutional capacity needed to transition to urban flood resilience?

In order to answer the main question, the following sub-questions are used:

- What does the transition to urban flood resilience entail and how can the concept of institutional capacity building be defined, and subsequently operationalized to contribute to this transition?
- What are the current aims and ambitions regarding flood risk management in Zwolle?
- How is Zwolle building institutional capacity to achieve its aims and ambitions?

1.4 Theoretical approach

This research mainly focuses on the institutional aspect of the transition in Dutch water management. Two concepts are therefore central in this research namely urban flood resilience and institutional capacity, these will be further elaborated in Chapter 2. The relations between the concepts used in this research are visualized in Figure 1. The combination of climate change and urbanization increases the flood risk in cities (Zevenbergen et al., 2008; Rosenzweig et al., 2018). The flood resilient city is often proposed as a promising concept to deal with this increased flood risk (Restemeyer et al., 2015). However, drawing from the problem statement, integration of flood resilient measures in urban flood risk management is still challenging (Restemeyer et al., 2015) because institutions are rather inflexible, unable to deal with deep uncertainty and often work in silos (Schoeman et al., 2014). Especially midsize cities have a lack of both financial and human resources to develop adaptive strategies (Dolman et al., 2018).

In order to move towards resilience approaches a rise in awareness and a change in mind-sets from both public and private stakeholders is demanded (Restemeyer et al., 2015). Institutional capacity building is proposed as a concept that can help cities to become more flood resilient (Restemeyer et al., 2015). Building institutional capacity should be an inherent objective in public policy (Healey, 1998). Institutional capacity holds three dimensions; 'its knowledge resources (K), its relational resources (R), and its capacity for mobilisation (M)' (Healey, 1998, p.1541) and is suggested to overcome institutional barriers (van de Meene et al., 2009). These three dimensions are also often referred to as intellectual capital, social capital and political capital (Healey, 1998; Restemeyer et al., 2015). To make the shift towards flood resilience, it is needed to build intellectual, social and political capital (Restemeyer et al., 2015). To build social and political capital, especially, is however one of the biggest challenges of this shift towards flood resilience (Restemeyer et al., 2015). After these concepts were elucidated, a systematic literature review was conducted to understand and operationalize institutional capacity building for this specific challenge. This results in an operational framework for institutional capacity building for water governance at the end of Chapter 2.

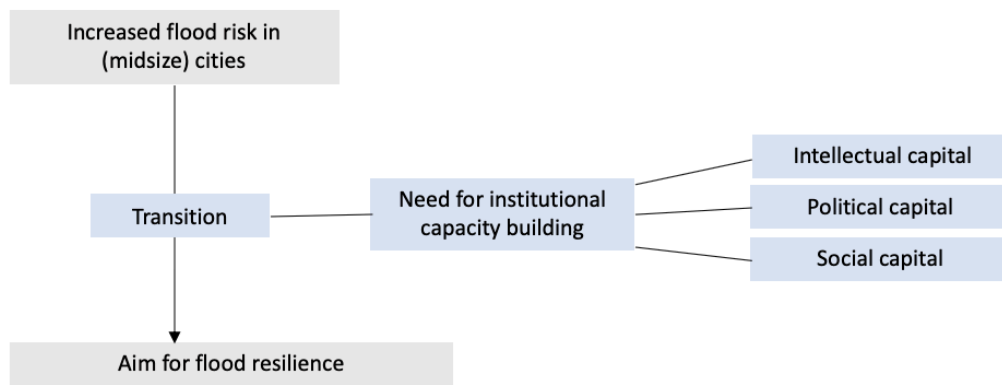


Figure 1: Conceptual model

1.5 Research design

This research is of a qualitative nature, two steps can be defined. First, a systematic literature review was carried out to learn more about the current use of institutional capacity building in water management literature and additionally, to complete the theoretical framework. Based on this review, an operational framework was created.

Second, a case study approach was used to test the operational framework that was created. The selected case for this approach is the city of Zwolle since it makes an interesting case as it is particularly vulnerable to extreme weather events because it is situated in the IJssel Vechtdelta, it has a city center that is located outside of the dikes and is part of the Interreg CATCH project (Interreg North Sea Region, n.d.). Semi-structured interviews are used to get information about the current state of urban water management in Zwolle and the implementation (and results) of the CATCH pilot.

1.6 Relevance of the research

The Ministry aims for a resilient, climate-proof and water robust spatial design of the Netherlands. The DPRA is introduced to make sure that a climate-proof and water robust spatial design of the Netherlands will be attained on time. The DPRA promotes extra measures to achieve the necessary acceleration for the urgency of this task (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2017). This also directly showcases the societal relevance of this research. It is deemed necessary, by the national government, to create a resilient spatial design in order to decrease the risks that climate change related issues bring about. This research adds to the understanding how a city can build institutional capacity to transition towards a flood resilient city and it offers an operational framework that planners can use in their cities. Moreover, the research will result in specific recommendations for Zwolle as to how they can further build institutional capacity to become a water sensitive city.

Zevenbergen et al. (2012, p.1219) argue that a ‘lack of understanding of the complex linkages between subsystems and services and the cascading effects of one subsystem upon another is a significant

constraint to establishing the full benefit and costs of any proposed flood risk management strategy'. Therefore, it is important to integrate social, economic and technical approaches (Zevenbergen et al., 2012). Restemeyer et al. (2015, p.59) add to this that 'flood resilience should not be a separate policy but integrated into a broader urban agenda.' Even though it is clear that social and institutional circumstances have a huge influence on the successful effectuation of flood risk management, research on the type of governance actions that are needed to enhance flood resilience remains limited (Driessen et al., 2018). In current literature institutional capacity building is a rather fuzzy concept and the relation to urban flood resilience remains unclear. This research adds to the understanding on how institutional capacity building can be operationalized for water governance.

1.7 Reading guide

This thesis consists of five chapters. In Chapter 1 the research is introduced and the problem statement, research objective and research questions are formulated. In the second chapter, the theoretical basis of the research is laid. This chapter answers the first sub-question and thus explains the concepts urban flood resilience, institutional capacity building and works towards the operationalization of institutional capacity building for water governance. In Chapter 3 the methodology will be elaborated; this includes data collection and data analysis methods. Furthermore, this chapter sets the stage for Zwolle as the selected case in this research. In Chapter 4, the results of the semi-structured interviews are discussed which also answers the second and third sub-questions. Finally, in Chapter 5, the research is finalized with the conclusion, recommendations, reflection and suggestions for further research.

Chapter 2: Institutional capacity building for urban flood resilience

In this chapter the theoretical basis for this research is formed. It aims to answer the first research question: ‘what does the transition to urban flood resilience entail and how can the concept of institutional capacity building be defined, and subsequently operationalized to contribute to this transition?’ The chapter starts with a literature review of urban flood resilience, then institutional capacity is defined and hereafter a systematic literature review is used to create an overview of institutional capacity building in current academic literature related to water governance. This results in an operational framework for institutional capacity building in water governance that is needed to implement adaptive approaches which contribute to the transition to urban flood resilience.

2.1 Developments in urban flood management

A lot of cities are increasingly vulnerable to flooding, mostly as a result of rapid urbanization (Zevenbergen et al., 2008). In addition, many cities are challenged by a combination of both riverine and pluvial floods (Sørensen et al., 2016). Especially pluvial flooding has become a significant concern in urban water management (Rosenzweig et al., 2018). Pluvial floods occur when the natural or engineered drainage systems are inadequate (Rosenzweig et al., 2018), often as a consequence of extreme rainfall (Sørensen et al., 2016). Changes in patterns of rainfall, as a result of climate change, are likely to increase the number and intensity of urban pluvial floods (Rosenzweig et al., 2018; Zevenbergen et al., 2008). Besides the change in rainfall patterns, risks related to pluvial flooding are predicted to increase influenced by population growth, ageing infrastructure (Rosenzweig et al., 2018), increased densification of cities and alterations in land use (Sørensen et al., 2016). Since the majority of urban areas is covered with impermeable surfaces (i.e. buildings, concrete and asphalt) they are more susceptible to flooding (Dolman et al., 2018; Sørensen et al., 2016). The main reason is that these impermeable surfaces do not allow excess water to be discharged fast enough, ‘resulting in flooding and damage to buildings, infrastructure and public spaces and ecosystems’ (Dolman et al., 2018, p.2).

The combination of an increase in both the number and the intensity of urban pluvial floods is expected to result in considerably bigger flood impacts than before (Zevenbergen et al., 2008). However, Sørensen et al. (2016) add, there are also other effects connected to climate change like depletion of water and rising temperatures that need to be taken into account in urban planning. Furthermore, Zevenbergen et al. (2008, p.82) argue that ‘cities are increasingly losing their capacity to deal with fast changes (peak discharges, extreme rainfall events) and the ability to anticipate and adapt to slow changes and trends (population increase, climate change)’. Since these changes and trends pertain to multiple disciplines, it has become clear that integrated approaches, on a variety of spatial scales, are needed to manage urban flooding (Zevenbergen et al., 2008).

It is generally agreed upon that traditional urban water management is inappropriate to deal with occurring sustainability issues that ask for more integrated approaches, now and in the future (Wong & Brown, 2009). Many researchers have proposed resilience as the most promising approach to urban flood risk management (Driessen et al., 2018). For example, Rosenzweig et al. (2018) argue that urban flood risks should be revised and include a plan of action to be more resilient when flooding occurs. Hence, cities are increasingly feeling the need to adapt to and prepare for changing environmental circumstances and to turn into more resilient cities (Laeni et al., 2019). As a result, various promising concepts have been developed such as the Flood Resilient City (Restemeyer et al., 2015), the Sponge City (Zevenbergen et al., 2018) and the Water Sensitive City (Brown et al., 2009).

2.2 The Water Sensitive City

This research focuses on midsize cities, like Zwolle, and the Interreg CATCH project which is based upon the Water Sensitive Cities theory. The Water Sensitive Cities theory specifies three pillars that need to be integrated in the urban environment: '(i) access to a diversity of water sources underpinned by a diversity of centralized and decentralized infrastructure; (ii) provision of ecosystem services for the built and natural environment; and (iii) socio-political capital for sustainability and water sensitive behaviours' (Wong & Brown, 2009, p. 673).

Brown et al. (2009) created a framework that shows six states that cities are going through in their transition to becoming a Water Sensitive City. This 'urban water transitions framework' emphasizes the hydro-social contract, 'this contract is shaped by the dominant cultural perspective and historically embedded urban water values, expressed through institutional arrangements and regulatory frameworks, and physically represented through water systems infrastructure' (Brown et al., 2009, p.848). Brown et al. (2009) use Scott's (1995) definition of institutions, which states that institutions are made up of three pillars which reinforce each other. These three pillars are: (1) 'Cognitive – dominant knowledge, thinking and skills; (2) Normative – values and leadership; (3) Regulative – administration, rules and systems' (Brown et al., 2009, p. 848). In order to achieve institutional change, these three pillars should co-evolve. Each of the six states of the framework, as shown in Figure 2, represents a noticeable change in all three institutional pillars (Brown et al., 2009). The transition through these six states depicts a historical development in which the changes in water management are influenced by the most pressing social-political driver at that moment in time (Brown et al., 2009).

The six states that cities go through are specified as follows (Brown et al., 2009, p.851-854):

- 1) In the water supply city, the main purpose of water management was to provide a continuous supply of water in growing urban regions.
- 2) In the sewerred city public health became the most important driver to start the construction of sewerage systems.

- 3) In the drainage city flooding became a concern and led to installation of drainage systems and channelization in order to provide flood protection.
- 4) In the waterways city there is a rise in awareness for environmental protection. This state is not merely an expansion of the hydro-social contract but challenges the use of the existing functions.
- 5) The water cycle city emerged as a result of the understanding that there are limits on natural resources, this implies experiments with more tailor-made service delivery functions.
- 6) The water sensitive city is resilient to climate change. The hydro-social contract is adaptive and flexible and evolves continuously.

The aim of CATCH is to kickstart midsize cities in their transition to become water sensitive cities and thus climate change resilient (Interreg North Sea Region, n.d.). However, the definition of resilience in this context remains unclear and is in need of further elaboration.

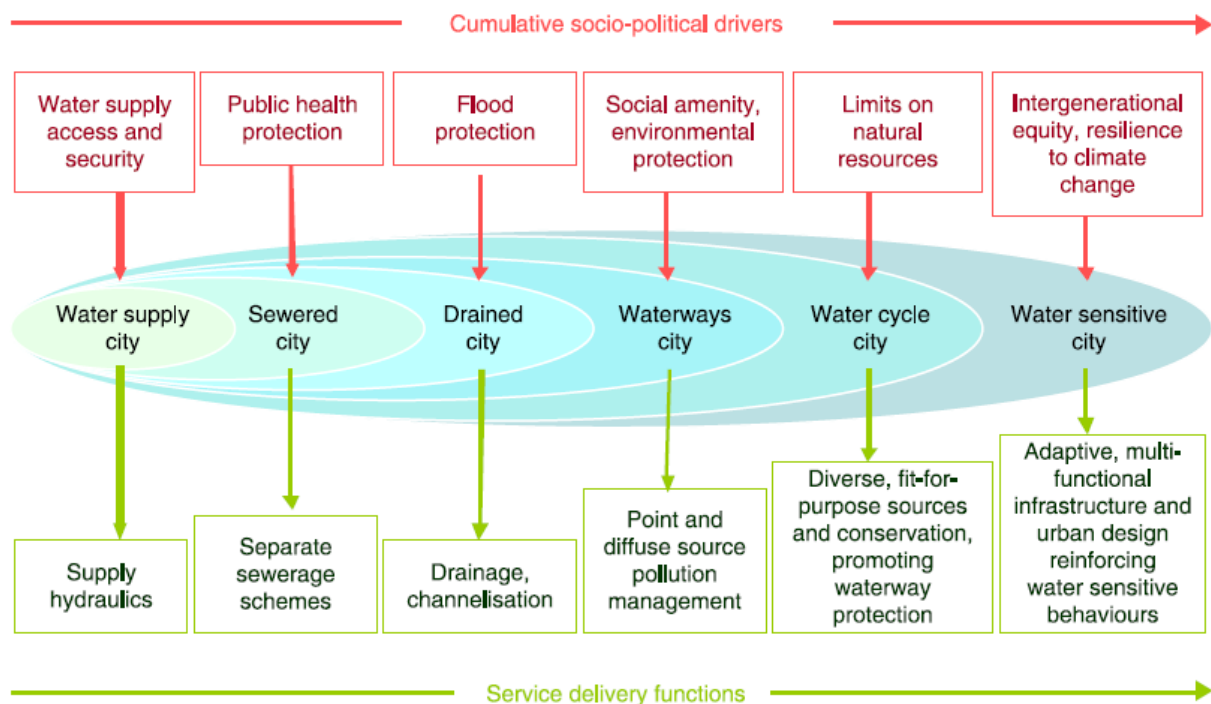


Figure 2: Urban Water Management Transitions Framework (Brown et al., 2009, p.850)

2.3 The resilience concept

Resilience is a term that can be interpreted in multiple ways; as the ability to absorb disruptions and gain new insights from these disruptions as well as society's capacity to adapt and transform (Wiering et al., 2017). Resilience according to Wong & Brown (2009) is not merely the ability of a system to be robust to disruptions but also the ability of a system to take chances from the disruptions to go after new paths. Davoudi (2012) explained that the resilience concept originates from physical science, where it was used to describe the features of a spring and to illustrate the resistance of objects to external disturbances. During the 1960s resilience started to play a role in ecology, where a division was made between engineering resilience and ecological resilience (Davoudi, 2012). Engineering resilience relates to 'the

ability of a system to return to an equilibrium or steady-state after a disturbance. The faster a system bounces back, the more resilient it is' (Davoudi, 2012, p.300). Ecological resilience refers to 'the magnitude of the disturbance that can be absorbed before the system changes its structure. Ecological resilience focuses on the ability to persist and the ability to adapt' (Davoudi, 2012, p.300).

Both of these viewpoints are built on the assumption that systems have an equilibrium, which can be seen as a stable state. In engineering resilience this is a state to which the system bounces back and in ecological resilience it is a new state to which the system bounces forth (Spaans & Waterhout, 2017; Davoudi, 2012). Evolutionary resilience, also referred to as socio-ecological resilience, questions the entire notion of having an equilibrium and argues that systems change ultimately with or without external interference (Davoudi, 2012). 'In this perspective, resilience is not conceived of as a return to normality but rather as the ability of complex socio-ecological systems to change, adapt, and, crucially, transform in response to stresses and strains' (Davoudi, 2012, p.302). This evolutionary resilience perspective gets increasing attention in urban flood resilience literature (Laeni et al., 2019).

2.4 The Flood Resilient City

Based on evolutionary resilience Restemeyer et al. (2015) use three aspects to define a flood resilient city: robustness, adaptability and transformability. Flood resilience is more focussed on risk management and not only trying to minimize the probability of a flood but also the consequences (Restemeyer et al., 2015). Robustness refers to the capacity of a city to resist a flood, adaptability indicates adaptation measures that will minimize the damage when a flood occurs and transformability refers to the capacity to realize the transition to flood resilience and promote societal change (Restemeyer et al., 2015). Driessen et al. (2018) emphasize that all three aspects should be present in order to be fully flood resilient. Diversifying flood risk management measures increases resilience since it allows to widen the focus on all three aspects (Driessen et al., 2018; Wiering et al., 2017). 'However, the extent to which approaches can be diversified depends on physical and institutional features, as well as general levels of development, flood risk management legacies, culture, and politics' (Driessen et al., 2018, p.5). Flood resilience is focused on improving a systems' performance rather than prevention and mitigation (Spaans & Waterhout, 2017). Sørensen et al. (2016, p.4) define resilience as 'the capacity to manage risks in an uncertain, ambiguous, complex, and dynamic world'. According to Spaans & Waterhout (2017) resilience recognizes the likelihood of disturbances that are unpredictable.

In particular evolutionary resilience stresses the diverse relations and the ongoing evolution of social and ecological systems (Restemeyer et al., 2017). 'This requires a new type of strategic policy and decision-making: while a long-term perspective is needed to enable a transformation, acknowledging uncertainties also requires room for adjustment along the way' (Restemeyer et al., 2017, p.922). It is often suggested that flood resilience demands an adaptive approach (Restemeyer et al., 2017). Thus,

when aiming for a city to become a resilient system, governance plays an important role (Hegger et al., 2016). To achieve adaptive management, adaptive governance is prerequisite, considering that adaptive governance is crucial for managing the complexity and uncertainty that is inherent to transforming social ecological systems (Hegger et al., 2016). Climate change issues such as extreme weather events act as stimuli to design adaptive approaches (Zevenbergen et al., 2008). Sørensen et al. (2016) therefore plea for an adaptive approach in which sustainability criteria are embedded and all involved parties are integrated. 'Flood risk governance encompasses the arrangements of actors, discourses, rules and resources through which flood risk management strategies are delivered and put into practice' (Wiering et al., 2017, p.16). Adaptive, integrated approaches should make a city more resilient and enlarge the social involvement in the environment (Sørensen et al., 2016). In order to implement an adaptive approach and transform cities into resilient cities, socio-technical changes opposing traditional approaches are needed (Wong & Brown, 2009). By changing the way a system is organised, a resilient city can stay functional and keep providing its services when a disruptive event occurs (Spaans & Waterhout, 2017). Furthermore Sørensen et al. (2016) add that becoming resilient must be seen as a continuous process of learning and alteration of conditions.

While adaptability and transformability are increasingly gaining more attention, implementation of such strategies in order to achieve flood resilience remains a challenge (Driessen et al., 2018). Zevenbergen et al. (2008) already determined that there is a missing link between strategy making and implementation in practice. Furthermore, they argued that the processes that bring about the transition need to be addressed. Eleven years later, Laeni et al. (2019, p. 158) still argue that 'despite its popularity, the resilience concept is difficult to operationalize and the adoption of resilience in an urban context is often criticized for a lack of critical consideration of the resilience building process and outcome'. Following from this, one could argue that there is a problem with implementation of urban flood resilience. An explanation for this problem could be the level of abstractness of resilience as a concept. Because of this, the division of authority and tasks among actors remains unsettled (Laeni et al., 2019). Therefore, Restemeyer et al. (2015) argue that it is needed to build institutional capacity among both public and private stakeholders in order to become more flood resilient. This concept will be elaborated in the following section.

2.5 Institutional capacity

First, the concept institutional capacity will be defined. There are several institutional barriers that obstruct the transition to more sustainable ways of water management (van de Meene et al., 2009). For example, institutions are often rigid and have a sectoral approach to complex issues (Schoeman et al., 2014). Furthermore, flood resilience may imply a change in the division of responsibilities away from governments towards civil society (Laeni et al., 2019). Rahayu et al. (2019) describe institutional capacity as an overall network capacity that goes further than what already exists among stakeholders

before working together. Furthermore, Dany et al. (2015, p.390) define institutional capacity ‘as an ability to mobilize existing institutions to address new policy issues, such as climate change’. Institutional capacity can be influenced and altered through strategic changes and practices in public policy (Healey, 1998). Certain challenges, such as those related to sustainability and urban flood resilience spread over multiple policy domains. To tackle such complex societal problems, many scholars have proposed to shift from conventional top-down approaches, towards more collaborative and adaptive bottom-up approaches with continuous learning processes (Bos et al., 2015). As a result of these learning processes it has become more common to already start collaborating at the beginning of a planning process (Healey, 1998). Characteristics that are often highlighted in this sense are: ‘stakeholder engagement, collaborative inter-organizational relationships, inter-disciplinary organizational operation and diverse knowledge at the individual sphere’ (van de Meene et al., 2010, p.2244).

According to Healey (1998, p.1541) institutional capacity comprises three dimensions; ‘its knowledge resources (K), its relational resources (R), and its capacity for mobilization (M)’. These three dimensions are respectively referred to as intellectual capital, social capital and political capital (Healey, 1998) as also used by Restemeyer et al. (2015). Intellectual capital refers to ‘the flow of knowledge of various kinds between stakeholders,’ social capital refers to ‘the nature, reach and quality of the relational networks brought into the governance process by stakeholders’ and political capital refers to ‘the ability of stakeholders and their networks to draw resources, rules and ideas into the effort of collective action’ (de Magalhães et al., 2017, p.54).

Institutional capacity building is a term that is being promoted in practice as well as in the academic literature for the mobilization of institutional changes (Brown, 2008). Building institutional capacity is often described as a strategy to overcome institutional barriers, to achieve sustainable institutional change and to successfully develop, adopt and implement adaptive water approaches (van de Meene et al., 2009). When the goal is defined and related strong capacity characteristics are identified, current capacity could be evaluated and capability building approaches could be built and applied to achieve this goal (van de Meene et al., 2009). Thus, the end-goal is to become a flood resilient city, that requires an adaptive water governance approach (Hegger et al., 2016; Restemeyer et al., 2017) and institutional capacity building is proposed as a concept to develop such an adaptive approach (Restemeyer et al., 2015). In the next section a proposal for the operationalization of institutional capacity building for water governance is made.

2.6 Operationalizing institutional capacity building

To learn how institutional capacity building can be operationalized for the transition to urban flood resilience, a systematic literature review was conducted. For this systematic literature review, articles

on institutional capacity in water management have been selected (see Chapter 3 for a methodological explanation), since there is still little literature on what institutional capacity means for urban flood resilience. The aim of the systematic literature review was to get a better understanding of the concept institutional capacity and to make the step towards operationalization of institutional capacity building. This specific selection of articles was chosen because the expectation was to learn how institutional capacity is built for adaptive water governance approaches. Based on this systematic literature review the three capitals (intellectual capital, social capital and political capital) can be operationalized as will be elaborated in the rest of this section. This eventually leads to the operational framework, for institutional capacity building towards an adaptive water governance approach, in Table 1.

For the operationalization of institutional capacity building it is important to realize that building institutional capacity requires flexibility in order to adapt to continuously changing external processes (Lamoree & Harlin, 2002). Or as Albrecht et al. (2018, p.1102) say: ‘another key feature of institutional capacity is the ability of institutions to be resilient to change’. Using a scenario-based strategy when thinking of potential approaches, for example by being flexible with the pace of implementation, enables the use of adaptation pathways (Zevenbergen et al., 2018). These pathways offer an understanding of lock-ins and path dependencies and present a wide array of alternatives. Adaptation pathways are meant to be especially useful to integrate flood risk management strategies to other proposed policies on the long-term (Zevenbergen et al., 2018). Creating actual institutional capacity is not a simple line of tasks that can be prepared in advance, but the constant engagement with external systems that either help or negate the intended development (Lamoree & Harlin, 2002).

2.6.1 Intellectual capital

Intellectual capital regards the knowledge resources which can be drawn from ‘previous experiences, scientific investigations and understanding of people, places and issues’ (Khakee 2002, p.55). It also involves sharing, discussing and finding new ways to interpret issues in order to get to decision-making that is broadly supported (Khakee, 2002). The arrangement amongst actors determines which knowledge resources are included in policymaking and which are not (Breukers & Wolsink, 2007). Examples of intellectual capital for the transition to flood resilience are expert knowledge in technical engineering, risk management, adaptive planning and the resources to create innovative plans (Restemeyer et al., 2015). For intellectual capitals four aspects are defined.

2.6.1.1. Education and training

First, the allocation of human resources reflects an essential part of capacity building. There is a pressing need for highly trained professionals whom are able to work across the multi-sectorial industry of water management (Hamdy et al., 1998). Current initiatives for capacity building, aimed at individuals, are providing training and education to urban water management experts for professional development (van

de Meene et al., 2009). This is seen as the Human Talent Development element of institutional capacity building (Lamoree & Harlin, 2002). Such training programs ought to be influenced by both the context and the individual and should therefore be tailor-made (Lamoree & Harlin, 2002). Thus, in the case of this research, professionals should be educated on the specific characteristics and flood risks of Zwolle. This training and professional development is a crucial element within the processes of institutional capacity building (Peng, 2013).

2.6.1.2. Knowledge exchange

Second, the degree of advantage of the newly acquired skill set through training and education is mutually reliant on the institutional context (Brown, 2008). Most knowledge remains centralized and exclusive, this obstructs the spreading and use of this knowledge among various stakeholders (Zevenbergen et al., 2018). Sharing little information results in limited trust amongst stakeholders and obstructed learning in decision-making processes (Wolsink, 2010). Sharing and spreading information is crucial to raise awareness and enhance broad support (Nikitina et al., 2010). Implementing new policy agendas asks for institutional conditions which support and strengthen mutual learning, ultimately striving towards better decision-making and establishing adequate institutional capacity (Wolsink, 2010).

2.6.1.3. Diverse knowledge

Third, institutional capacity building promotes open policy and decision-making processes, which give access to various stakeholders and include diverse knowledge resources (Wolsink, 2010). Experts and researchers take an important part in bridging the gap between government and civil society when it comes to knowledge resources (Peng, 2013). Sharing and improving knowledge, skills or networks will consolidate climate change adaptation (Dany et al., 2015). Providing a meaningful and powerful position to local stakeholders empowers them to contribute and to share their specific knowledge, information and values (Wolsink, 2010). Jonsson & Wilik (2014) add that including representatives from all parties involved increases the knowledge throughout co-production processes. These various knowledge resources are appreciated and widely supported by individuals (van de Meene et al., 2010). Creating a sustainable information flow means that there is access to knowledge from several sources at any time (Lamoree & Harlin, 2002). It is of importance to create strong ties with media platforms, making information available and easy to understand for everyone (Nikitina et al., 2010). To increase capacity building amongst local stakeholders, information that is being spread in relation to climate change and its vulnerability has to be more extensive instead of general (Dany et al., 2015).

2.6.1.4. Innovation and learning

Finally, stimulating innovation and emulating new policy agendas, mainly within governmental institutions, is important (Rahayu et al., 2019). Innovation here means that influential practices and

certain beliefs in governmental processes need to be questioned in order to change governance culture, resulting into institutional capacity (Rahayu et al., 2019). Institutions are expected to stimulate creativity throughout the creation of novel perspectives (Wolsink, 2010). That creates opportunities towards creative alliances and helps develop the capacity amidst local stakeholders to work together in order to solve shared issues (Peng, 2013). Organizational and policy learning will be essential when it comes to real innovation, requiring the will for institutional change (Wolsink, 2010).

2.6.2 Social capital

‘Social capital means social network resources that enable collaboration between a broad range of partners in order to achieve support and enhance the capacity to co-ordinate decisions and actions. Social capital involves thinking through the relations between activities, people and places’ (Khakee, 2002, p. 56). Social capital reflects the mutual reliance between and on institutions (Breukers & Wolsink, 2007). In general, building social capital demands a local and collaborative approach which focuses on empowerment and not solely informing (Restemeyer et al., 2015). For the transition to flood resilience this means strong bonds between water managers and spatial planners, working closely together with disaster managers, trust amongst all stakeholders both public and private and raising high levels of awareness and readiness to participate in the community (Restemeyer et al., 2015). For social capital there are three main elements that need to be considered.

2.6.2.1. Relational networks

First, urban water management systems are expected to become more complex with diverse governance structures comprising of several agencies at various scales, thereby further underlining the importance of intra- and inter-organizational networks (van de Meene et al., 2009). Therefore, it is important to strengthen the relationship between academia and citizens, between local and external people and between various generations in order to ensure a better level of place-making (Peng, 2013). Hamdy et al. (1998) add that the competencies at all different levels of government have to be clear to institutions, lobbyists and individuals and that both the formal and informal network of organizational and legislative structures should be acknowledged. Adequate communication is key to help reduce issues that may arise and to enhance collaboration among government agencies (Yu et al., 2012). With any institutional change, both public and private actors must have an active role in the decision-making (Lamoree & Harlin, 2002). The right circumstances for this to occur arise through dissemination of information, dialogue and engaging with stakeholders in order to raise awareness and ultimately come to a mutual agreement on the choices that have been made to implement institutional development (Lamoree & Harlin, 2002).

Therefore, Lamoree & Harlin (2002) suggest that institutional capacity building plans must be seen as networking projects flourishing from good communication and collaboration. Highlighting this

networking capacity strengthens the validity of the cooperation within a region (Rahayu et al., 2019). According to Dolman et al. (2018) midsize cities are relatively dependent on their surrounding region and do not have the capacity to act as autonomous entities. Therefore, it might even be more relevant to be embedded in a collaborative network.

2.6.2.2. Shared values

Second, organizational relations call for shared trust, goals and values (van de Meene et al., 2010). Participatory processes aimed at managing and developing public services, including resilience and protection, need institutional structures that promote knowledge sharing and mutual trust (Wolsink, 2010). Hamdy et al. (1998) present having an open mind, acknowledging different viewpoints, respect for and trust in partners as crucial aspects for formulating sustainable goals. Hence, it is simple to justify the creation and stimulation of open discussion, stakeholder involvement and an open decision-making process (Hamdy et al., 1998). An important issue in this regard is raised by Laeni et al. (2019) who argue that resilience is often interpreted in different ways. This also makes it harder to operationalize. Colvin et al. (2008) learned that people who were involved in collaborative ways of institutional capacity building reacted positively to this, since such approaches allow them to come to a common ground collectively and find out which capacity-building strategies are best suited for the specific situation.

2.6.2.3. Community participation

Third, the presence and engagement of the citizens and other stakeholders is seen as a cornerstone in water governance (van de Meene et al., 2009). Water management should not only focus on deliberation with partners, but more so on including relevant actors on all levels (Schreiner, 2013). These relevant actors consist of civil initiatives, community representatives, water utility services, NGO's, the academic community and the private sector (Schreiner, 2013). Collaborative planning approaches stem from developing a shared insight, creating space for creativity and synergies and increasing stakeholder capacity to collaborate on a local level (Peng, 2013). According to Breeveld et al. (2013) more emphasis should be placed on finding the local wants and needs, then crucial areas that are in need of change can be identified easily. This should be helpful since socio-cultural standards influence people's perspective and therefore influence community engagement which causes differences between regions and countries (Yu et al., 2012). Stakeholder participation is among the most effective instruments to good governance in water management since it strengthens institutional capacity and improves the flexibility to respond to challenges (Nikitina et al., 2009). Involvement of a variety of stakeholders in shared decision-making processes, increases the feeling of responsibility, credibility and viability (Zevenbergen et al., 2018).

2.6.3 Political capital

'Political capital implies commitment and willingness among not only politicians and government officials but also among citizen movements and stakeholder groups to shape agendas and take actions.

This is based on mutual trust and respect among all those involved and is necessary for building consensus, influencing policy-thinking and mobilizing resources' (Khakee, 2002, p. 56). Breukers & Wolsink (2007) add that political capital refers to the extent to which all stakeholders have the opportunity to be involved in the process of policy making. Political capital is very important when transitioning to a resilience approach since a lot of public money is needed in order to facilitate this transition (Restemeyer et al., 2015). Political capital can thus be seen as financial resources for example for adaptation measures and creation of interdisciplinary networks (Restemeyer et al., 2015). Moreover, there is need for leadership and policy entrepreneurs to stimulate change in stakeholders' visions (Restemeyer et al., 2015). For political capital also three aspects are specified.

2.6.3.1. Organizational leadership

First, there should be leadership to inspire and to motivate staff and there should be a clear strategic vision with plans of action (van de Meene et al., 2009). Leaders need to create long-term plans on the challenges in the environmental, socio-economic and institutional structures, hereby also being aware of the effects of different cultural backgrounds (Hamdy et al., 1998). Leadership and change agents have shown to be very valuable in making legal changes possible (Restemeyer et al., 2015). Tran & Tuan (2020) show that policy decisions through strong leadership on both the central as well as the local level have affected the way water can be managed to a great extent. Laeni et al. (2019) add the critical note that the power relations must be carefully considered and to keep an eye on whose stakes have priority in order to protect vulnerable communities.

2.6.3.2. Mobilization capacity

Second is mobilization capacity, which includes the finding and defining of problems, mobilization of funding and human capital and building consensus (Rahayu et al. 2019). Institutional capacity is expected to be impeded by undefined authority and responsibility as these suggest the inability to connect formal, informal, community-based and local governmental organizations (Jonsson & Wilik, 2014). In addition, institutions that are properly managed are equipped to: tackle the allocation of work, exchange external services, find the connection between varying sorts and levels of organizations and resolve conflicts (Jonsson & Wilik, 2014). Viable human resources imply that personnel is properly equipped and allocated within the organization and can be preserved or replaced internally (Lamoree & Harlin, 2002). According to Dolman et al. (2018) this might be an issue in midsize cities because they specifically face a shortfall of expertise and too little manpower.

2.6.3.3. Resources

Lastly, to build institutional capacity you need resources and time (Albrecht et al., 2018). A crucial challenge for mid-sized cities is that they have less financial resources in order to cope with climate change challenges and to produce adaptive approaches compared to large cities (Dolman et al., 2018).

Government officials on the local level often also perceive that there are constraints in resources and that there is too little technical capacity to assess and implement cutting-edge ideas (van de Meene et al., 2009). Dany et al. (2015) add that too little financial resources limit the governmental agencies' capacity to improve existing plans to properly adapt to newly gained knowledge. Other difficulties might include the possibility that current political structures and path dependency restrict institutional changes (Albrecht et al., 2018).

2.7 Operational framework

Summarizing, the combination of climate change and urbanization leads to increased flood risks in (midsized) cities. The ambition in Zwolle is to become a Water Sensitive City and thus flood resilient. In order to become flood resilient a transition is needed. Since this transition has proven to be quite challenging, institutional capacity building is proposed as a promising concept to help the implementation of adaptive approaches and subsequently realize the transition to urban flood resilience. The three pillars that build institutional capacity are intellectual capital, political capital and social capital. Based on a systematic literature review, a suggestion for the operationalization of institutional capacity building in water governance is proposed in Table 1. The operational framework is used as a guideline to answer the sub-question: 'how is Zwolle building institutional capacity to achieve its aims and ambitions?' In the next chapter the methodology is explained and the case of Zwolle is introduced.

	Institutional capacity building criteria	Operationalization for water governance	Source
Intellectual capital	Education and training	<ul style="list-style-type: none"> Provide training and education for professional development. 	Van de Meene et al. (2009); Peng, (2013)
	Knowledge exchange	<ul style="list-style-type: none"> Share and spread information to raise awareness and enhance broad support. 	Nikitina et al. (2010); Wolsink, (2010)
	Diverse knowledge	<ul style="list-style-type: none"> Include various types of knowledge such as expert knowledge, technical knowledge and local knowledge. 	Peng (2013); Dany et al. (2015); Wolsink, (2010)
	Innovation and learning	<ul style="list-style-type: none"> Question influential practices and beliefs in order to change governance culture. Create opportunities towards creative alliances. 	Peng (2013); Dany et al. (2015); Wolsink, (2010)
Social capital	Relational networks	<ul style="list-style-type: none"> Strengthen the relationship between academia and citizens, between local and external people and between various generations. Include both public and private actors in decision-making. 	Peng, (2013); Lamoree & Harlin, (2002)
	Shared values	<ul style="list-style-type: none"> Increase mutual trust between institutions and formulate shared goals. 	Wolsink, (2010); van de

			Meene et al. (2010)
	Community participation	<ul style="list-style-type: none"> Engage local communities and other relevant stakeholders. Place emphasis on finding the local wants and needs. 	Van de Meene et al. (2009); Breeveld et al. (2013)
Political capital	Organizational leadership	<ul style="list-style-type: none"> Create leadership with a clear strategic vision and plans of action. 	Van de Meene et al. (2009)
	Mobilization capacity	<ul style="list-style-type: none"> Allocate work and personnel, exchange external services, find the connection between varying sorts and levels of organizations and resolve conflicts. 	Jonsson & Wilik (2014)
	Resources	<ul style="list-style-type: none"> Create or find enough time and financial resources to implement adaptive approaches. 	Albrecht et al. (2018); Dolman et al. (2018)

Table 1: Operational framework

Chapter 3: Methodology

This chapter focuses on the methodology that was used for this research and will elaborate on the research methods that are used. The first step in this research was the systematic literature review to form an operational framework for institutional capacity building. Then the use of a case study and the case selection of Zwolle are discussed. Hereafter, the data collection through semi-structured interviews and the analysis thereof is explained and lastly ethical considerations are taken into account.

3.1 Research methods

In this research there are three main methods being used. The first one is literature research; this is important for the formation of the theoretical framework and was used to find the current status of the debate. With a literature research the aim is to find the best-suited references for your research. Reading about a topic helps to broaden your image and refine your ideas (Healey & Healey, 2010). Next, a systematic literature review was carried out to find out what current literature says on what institutional capacity entails in the context of water governance. In this systematic literature review all current literature on this topic was analysed in order to identify characteristics for institutional capacity building. This systematic literature review was used to develop a framework for the operationalization of institutional capacity building. This framework is discussed in Chapter 2 (Table 1). These two methods were mainly used to answer the first research question: what does the transition to urban flood resilience entail and how can the concept of institutional capacity building be defined, and subsequently operationalized to contribute to this transition?

In order to answer the other two research questions ‘what are the current aims and ambitions regarding flood risk management in Zwolle and how is Zwolle building institutional capacity to achieve its aims and ambitions?’ a case study approach was used. The aim of the case study was to test the operational framework created in Chapter 2 by means of semi-structured interviews. There are different ways to conduct interviews. For a structured interview, the interviewer prepares a questionnaire which is followed during the interview (Longhurst, 2010). Semi-structured interviews provide more room for flexibility, but there still is a questionnaire that is used as a guideline (Longhurst, 2010). This gives interviewees the opportunity to highlight what they think is most important. Semi-structured interviews are seen as the most suitable data collection method because the knowledge of the interviewee is unknown in advance (Longhurst, 2010).

3.2 Systematic literature review

3.2.1 Article selection Scopus

The Scopus search for the article selection was conducted on the 13th of December 2019. Using the Scopus Sources page (<https://www.scopus.com/sources.uri?zone=TopNavBar&origin=sbrowse>) a selection was made as follows.

Step 1:

- a. The first limitation was the selection of the source type “journals”.
- b. The search started with finding the right Sub-Subject Areas in Scopus. At first the search was limited to the Subject Area “social sciences” → this resulted in 7197 journals.
- c. Then the search was narrowed down to the Sub-Subject Areas “Geography, Planning and Development”, “Transportation” and “Urban Studies” → Geography, Planning and Development contained 889 journals, Transportation contained 124 journals and Urban Studies contained 200 journals.
- d. Together these three Sub-Subject Areas resulted in a selection of 1082 journals
- e. To get the full picture however, other water and climate change journals should also be part of the selection. Thus, a couple other Sub-Subject Areas were added to the selection. These are “Water Science & Technology”, “Global & Planetary Change” and “Environmental Science (miscellaneous)” → these contained 294, 85 and 87 journals respectively.
- f. The selection of all six Sub-Subject Areas together yielded a total of 1457 journals.
- g. Then the Scopus Source List was downloaded including metrics and made the same selection in this file in the tab “2018 All”. This tab contains documents from 2015-2017 that are cited in 2018 and is the most recent information available → this resulted in 1177 journals.
- h. Then all doubles were deleted, based on the Scopus Source ID → this resulted in 1013 journals.
- i. These 1013 journals will be the input in the advanced Scopus search.

Step 2:

- a. Use the Print ISSN and EISSN numbers from all 1013 journals as input for the advanced search → this results in 980.686 documents.
- b. Add the criteria institutional capacity or institutional capital. Using “institutional capa*” AND “institutional capi*” to include plurals as well → this resulted in 577 documents. These are all documents within the 1013 journals that include institutional capacity or institutional capital.
- c. To narrow down the selection further, add water as a criterion → resulted in 100 documents. These are the documents that were searched for (see syntax in Appendix A).

Step 3:

- d. From these 100 documents only articles that are published in journals and that are written in English were needed to be filtered out. Therefore, some more limitations should be added. First select Source Type “Journal” → resulted in 97 documents
- e. Then limit to Document Type “Article” → resulted in 85 documents
- f. Then limit Language to “English” → this resulted in a final selection of 85 documents.

3.2.2 Data analysis

The selected data consists of 85 journal articles and 7 interview transcripts. The analysis of these will be discussed in more detail separately, but the use of coding is important for both. Coding is labeling pieces of text on the basis of categories that are related to the research (Cope, 2010). Coding is a way to evaluate and organize the collected data in order to help interpreting the text and to help recognizing categories and patterns (Cope, 2010). There are two types of coding; deductive and inductive coding. Deductive coding means that a coding scheme is produced before the data analysis. These codes are deducted from the theoretical framework (David & Sutton, 2004). With inductive coding the codes are being generated during the data analysis (David & Sutton, 2004). The analysis is not finished with coding. The codes are linked to the theoretical framework and themes can be discovered which provide the primary input for the results (Cope, 2010).

The input to start the systematic literature review were 85 journal articles. However, among these 85 articles there were still several articles that did not fit with the research topic. The articles that were intended to be found were selected in the next step. By reading the abstracts of all 85 articles a selection was made of 21 articles that were appropriate for this research. These 21 articles were the final selection for the systematic literature review. This selection was coded using Atlas.TI. The articles were coded both deductively and inductively. From the five articles that related most to this research, based on the abstracts, and what was already found in the literature study a coding scheme was derived. This coding scheme can be seen in Table 3 below and was used to code the 21 articles deductively. To this coding scheme some keywords were added as attention points.

Code	Keywords
Shared meaning	Joint problem solving and learning
Innovation	Creativity
Knowledge exchange	Local/tacit knowledge, information sharing, learning
Relational networks	Community capacities, integration among stakeholders, participatory decision-making

Mobilization capacity	(Local) leadership
Community participation	Stakeholder engagement
Resources	Funding and time
Human resource development	Recruitment and training
Intra- and interorganizational development	Incentive systems, communication
Institutional reform	Policy and legal change

Table 2: Coding scheme for systematic literature review

These attention points were also a reason to continue coding inductively as well. The purpose of this was to stay as close as possible to the original text. After coding all 21 articles, there were 61 codes in the Atlas.TI code manager. These codes were grouped by the capitals of institutional capacity building and some of the codes were merged together as they were very similar. This resulted in the code book as shown in Table 4. From this, the codes that were most widely represented and clearly defined were selected as most important. Here again, some codes were merged or renamed and this then formed the basis for the operational framework as presented in Chapter 2.

Code group	Code
Institutional capacity building	A systems approach
	Adaptability and flexibility
	Institutional capacity
Intellectual capital	Availability and quality of information
	Broad knowledge
	Education and training
	Evaluation
	Information sharing
	Innovation
	Learning
	Local knowledge
	Scientific cooperation
	Shared meaning
	The level of understanding
Social capital	Awareness raising
	Collaborative approach
	Communication
	Community participation
	Continuous interaction

	Cooperation and coordination of stakeholders
	Informal approach
	Intra- and interorganizational strengthening
	Local engagement
	Local stakeholders
	Network projects
	Networking capacity
	Open communication
	Participatory planning
	Public engagement
	Relational networks
	Relationships within and across the three capacity areas
	Social acceptance
	Societal and cultural norms
Political capital	Clear strategic direction
	Clear vision
	Division of responsibilities
	Enabling environment
	Effective leadership
	External rules
	Formal pathway
	Institutional development
	Institutional reform
	Interlinking various investment agendas
	Inter-local government cooperation
	Long-term view
	Mobilisation capacity
	Power struggles
	Resources
	Transparency
	Trust
	Water treaties
	Working environment

Table 3: Code book as a result of systematic literature review

3.3 Case study

Case studies are suitable for answering ‘how’ or ‘why’ questions (Baxter and Jack, 2008). Case studies are ideal for small-scale, in-depth research (Taylor, 2016). Most case studies include data from observation, interviews and document research (Taylor, 2016). The case of this research is Zwolle which is a pilot city in the CATCH project (Interreg North Sea Region, n.d.). The case selection will be elaborated in the coming section.

3.3.1 Case selection

The North Sea Region, as shown in Figure 3, consists of 49 regions in seven countries surrounding the North Sea (Interreg North Sea Region, n.d.). In this region, a vast majority of the people (80%) live in urban areas and many of these cities are midsize cities accommodating between 20.000 to 200.000 inhabitants (Dolman et al., 2018). The entire catchment of the North Sea spreads over an area of about 850.000 km² (Quante & Colijn 2016). Because the North Sea Region mainly consists of low-lying areas, climate change effects like rising sea levels could have enormous impact on the region’s economy and livelihood (Interreg North Sea Region, n.d.). Although current flood defenses should be strengthened it should also be acknowledged that traditional solutions are no longer sufficient to stand against projected extreme weather events, therefore the North Sea Region should set pace in the development and use of adaptive techniques (Interreg North Sea Region, 2015). In order to do so Interreg North Sea Region started the CATCH project, the aim of CATCH is to speed up the process (specifically for midsize cities) to become climate resilient (Interreg North Sea Region, n.d.).



Figure 3: Programme Area Interreg North Sea Area (Interreg North Sea Region, n.d.).

In the CATCH project, a decision support tool is developed which midsize cities can use to create a climate adaptation strategy on the long term (Dolman et al., 2018). The cities that are participating in the CATCH project, are already perceiving negative impacts of climate change like a higher occurrence and severity of flooding, problems with the quality of water and urban heat (Dolman et al., 2018). Despite the fact that midsize cities are also aware of the necessity to acquire climate adaptation policies, the attention of research, politics and planners is often received by big cities or even metropolitan agglomerations, meaning that midsize cities stay out of the loop (Dolman et al., 2018). Midsize cities have their own distinguishing characteristics as opposed to large cities. They have ‘(a) lower number of inhabitants, (b) a smaller scale, (c) less resources available for strategic processes and (d) a larger connection and dependency with the surrounding regions and partners’ (Dolman et al., 2018, p.3). Therefore, there are certain challenges that midsize cities encounter when trying to manage climate change issues. As mentioned before, Zwolle is a pilot city in the CATCH project (Interreg North Sea Region, n.d.) and already active in the field of climate adaptation with the creation of their own adaptation strategy (Zwolle Adaptatiestrategie, 2019). This case was selected to see how it is building institutional capacity and to see how other midsize cities can learn from a frontrunner like Zwolle.

3.3.2 Interview guide and time schedule

The interview guide, which can be seen in Appendix B, has been used as a guideline for the interviews. In this interview guide all aspects of the operational framework; intellectual capital, social capital and political capital can be found. Semi-structured interviews are more of a conversation, however the researcher must carefully formulate their questions, choose and approach their participants, transcribe the data and acknowledge any ethical matters (Longhurst, 2010). The aim of the interviews is to get an insight in the current state, aims and ambitions in the case of Zwolle and to find out how the aspects found in the literature relate to the interviewees’ experiences in practice.

To select fitting interviewees is a crucial part in conducting semi-structured interviews, people are often selected based on their experience within the research topic or area (Longhurst, 2010). As opposed to quantitative methods, the aim of this method is not to be fully objective but rather to create an in-depth understanding of individual experiences (Longhurst, 2010). For this research, interviewees were approached via e-mail or phone. The first interviewees were so-called cold callers (Longhurst, 2010), found through the general pages of the municipality, province, waterboard and CATCH. Some of the latter interviewees were referred by others, this is called snowballing (Longhurst, 2010). All interviewees are experts in the field of climate change adaptation and/or involved in climate change adaptation projects in Zwolle. See Table 4 for an overview of the interview dates, interviewees’ functions and the used platform.

Due to the Covid-19 outbreak in March 2020 and the governmental lockdown regulations that followed it was not possible to conduct the interviews in real life. Luckily, all interviewees were very flexible and there are good digital solutions in this day and age. Therefore, except from some minor re-arrangements the interviews could still take place as planned but then through Skype, Zoom or Microsoft Teams. Although not in real life, these platforms still allowed for a face-to-face interview and this was positively experienced by all parties. All interviewees were asked permission to record the interview, these recordings are all transcribed. All transcripts have an identifier which will be used to reference in the analysis, these identifiers correspond with Table 4 below.

Date	Interviewees	Identifier	Interview via
March 10, 2020	Assistant Professor in Water Governance University of Twente and project manager for the University of Twente in CATCH	R1	Skype
March 16, 2020	Coordinator Climate Campus Municipality Zwolle and Leading Professional in Water Resilient Cities RoyalHaskoningDHV	R2	Skype
March 27, 2020	Policy advisor Climate Adaptation Waterboard Drents Overijsselse Delta	R3	Microsoft Teams
April 2, 2020	Programme Secretary IJssel-Vechtdelta Province Overijssel	R4	Zoom
April 6, 2020	Policy advisor Climate Adaptation Municipality Zwolle (officially Waterboard Drents Overijsselse Delta)	R5	Zoom
April 16, 2020	Communication advisor Programme IJssel-Vechtdelta Province Overijssel	R6	Zoom
April 29, 2020	Policy advisor Spatial Adaptation Municipality Zwolle	R7	Zoom

Table 4: Overview of interview participants

3.3.3 Data analysis

After transcribing, the next step was to code the interviews. The interviews are coded using the coding scheme in Table 5. As mentioned above, this allows to structure the data and to find trends within the transcripts, which forms the basis for the results (Cope, 2010). The coding scheme used is based on the theoretical framework produced in Chapter 2.

Code group	Code
Process	Current policy
	(Urban water) challenges
	Ambitions and goals
Intellectual capital	Education and training
	Knowledge exchange
	Diverse knowledge
	Innovation and learning
Social capital	Relational networks
	Shared values
	Community participation
Political capital	Organizational leadership
	Mobilization capacity
	Resources

Table 5: Coding scheme for interviews

3.4 Ethics

Permission from the interviewee is required for the use of the interview in this research. The ethical issues that should definitely be considered are confidentiality and privacy (Longhurst, 2010). To ensure this, interviewees are made aware of their options at the beginning of the interview; for example, interviewees can withdraw from the interview at any time, change their answers or withdraw their answers altogether. Afterwards, a copy of the transcript will be sent to the interviewees if they wish so. In addition, only the function, and never the name, of the interviewee is mentioned in the research. Moreover, it is made clear to the interviewees that the interviews will only be used for the purpose of this research (Longhurst, 2010). The interviews are taken by me as a master student Environmental and Infrastructure Planning at the University of Groningen and independently of any other organizations. This will not lead to any conflicts.

Chapter 4: Zwolle towards a water sensitive city

The aim of this chapter is to get in-depth knowledge of the state urban water management in Zwolle is in by analyzing the data from the semi-structured interviews with professionals in urban water management or climate change adaptation. The operational framework created in Chapter 2 was used as a guideline to see how Zwolle is building institutional capacity. Questions that are intended to be answered are: what are the aims and ambitions of flood risk management in Zwolle and how is Zwolle building institutional capacity to achieve its aims and ambitions? The key observations with regards to institutional capacity building in Zwolle are summarized at the end of this chapter in Table 6.

4.1 Status quo in Zwolle: current aims and ambitions

As mentioned before, Zwolle is highly active in climate change adaptation. There are several initiatives that Zwolle is involved in. Figure 4 presents a brief summary of the most relevant initiatives mentioned by the interviewees and the aims of these initiatives. Hereafter, an elaborate description of the initiatives is given in order to get a better understanding of the current state of urban water management in Zwolle.

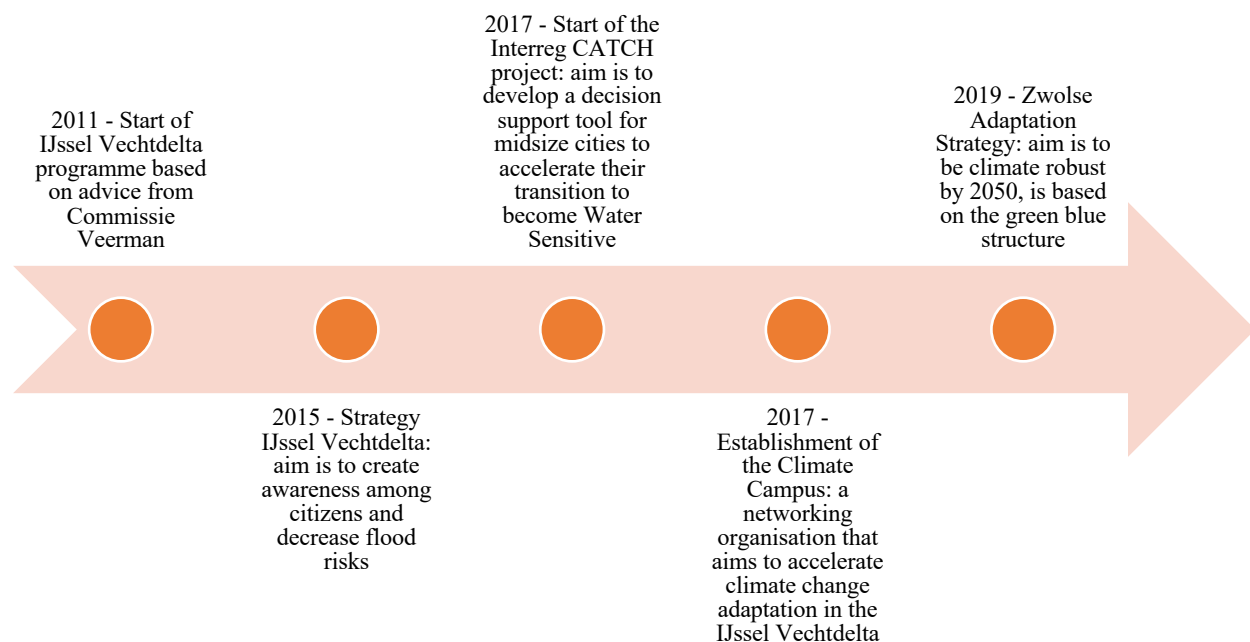


Figure 4: Timeline initiatives Zwolle

With the development of the second Deltaprogramme in 2011, the commissie Veerman identified the IJssel Veichtdelta as an area that was in need of special attention. The IJssel Veichtdelta is very susceptible to extreme weather events due to where it is situated (Strategie IJssel Veichtdelta, 2015). In this low-lying delta, the IJssel, the Vecht and the Sallandse Weteringen flow into the Zwarte Water and the Ketelmeer. Moreover, the IJssel Veichtdelta is one of the most important economic growth regions in the Netherlands (Strategie IJssel Veichtdelta, 2015). Therefore, the municipalities of Zwolle, Kampen and Zwartewaterland, the waterboard Drents Overijsselse Delta, the province of Overijssel, the ministry

of Infrastructure and Water and the safety region IJsselland joined forces in the IJssel Vechedelta programme to deal with climate change related challenges. This resulted in a strategy for the IJssel Vechedelta in 2015, this strategy consisted of plans to decrease the vulnerability of the region. An important objective of this programme was also to create awareness among citizens. Other plans were focused on lowering flood risks and creating climate robustness (Strategie IJssel Vechedelta, 2015).

Most of the interviewees mentioned that there is quite some urgency in the case of Zwolle because of the fact that the city is situated in the IJssel Vechedelta and it is home to a lot of economic and social activity. Following the DPRA, Zwolle performed a climate stress test to picture its vulnerabilities (Zwolle Adaptatiestrategie, 2019). Based on this climate stress test several focus areas have come to attention, these are mostly pre-war neighborhoods with very little green and blue spaces. Interviewees explain that this pushes the municipality to have these climate change threats high on the agenda and to make climate change adaptation a concrete specific policy issue, so funds can be allocated and people can be dedicated in climate change adaptation teams. In general, the ambition in Zwolle is in line with the national ambition to be climate proof by 2050 (Zwolle Adaptatiestrategie, 2019). However, a policy advisor from the waterboard mentioned that Zwolle wants to develop itself as a growth region and a role model for the rest of the Netherlands with regards to climate change adaptation. Therefore, Zwolle created the Zwolle Adaptation Strategy (hereafter: ZAS) which is based on a green blue structure. In the spring of 2017, the municipality started with the development of the ZAS and in 2019 it was finished (Zwolle Adaptatiestrategie, 2019). The green blue structure is intended to work like a sponge, and absorb and distribute the water that comes into the city. Moreover, this green blue structure entails more climate change adaptation strategies than just flood risk management, it also addresses for example urban heat islands. The aim is to introduce this green blue structure broadly in the municipality so that it can be integrated in all urban development projects.

4.1.1 The CATCH project

Like many other cities, Zwolle is still facing the challenge of putting these plans in practice and also seeing that these plans work after implementation. Interreg CATCH is a European project that aims to help midsize cities to become water sensitive cities (Interreg North Sea Region, n.d.). The CATCH project consists of seven pilot cities (Arvika, Enschede, Herentals, Norwich, Oldenburg, Vejle and Zwolle) and is mainly focused on self-assessment. CATCH involves collaboration amongst its pilot cities in the field of governance, innovative applications and knowledge sharing (Strategie IJssel Vechedelta, 2015). Within CATCH, Zwolle is mainly about community building. So about working together especially with local residents and entrepreneurs. The pilot takes place in two neighborhoods Wipstrik and Stadshagen. The lessons learned from CATCH in Zwolle with regards to community building are input for the broader Interreg CATCH project. The aim of CATCH is to design a web-based decision support tool that midsize cities can use to assess their current status with regards to climate

change adaptation and that helps to improve the decision-making processes around climate change adaptation. Within this decision support tool all participating cities can share their experiences, which allows cities to learn from each other. On the other hand, this tool proposes tips on how to transition to the next state in the water sensitive city framework.

Pilots are seen as a step in the right direction since a lot of these pilots are also part of a broader program nationally, sometimes funded by the Dutch national or regional governments and sometimes transnational like the CATCH project. Pilots are, in any case, useful to take action to test things and learn from other cities and other stakeholders outside municipalities that are responsible. Concluding from the CATCH project, the challenge again is to make these pilots mainstream. To avoid that they are one-time implications of a certain approach or technology, but become mainstream projects that continue. To achieve this, there should be sufficient funding and personnel.

Another issue that became apparent within CATCH is that floods and droughts are seen as separate problems and have different policies. Multiple interviewees mentioned that there is an integration issue also in Zwolle. Climate change is a relatively young policy sector that municipalities and other governmental organizations are now incorporating into existing policy sectors. This creates an adaptation or flexibility issue; stakeholders are already working with certain responsibilities and certain infrastructures for a long time and the utilities and the infrastructure that are in place cannot be changed easily. So, there is a kind of inflexibility which causes that measures cannot easily be introduced into this existing large-scale system. Furthermore, there is an inflexibility in terms of the way that departments are organized, for instance with CATCH in Zwolle, people are often addressed as water experts or urban planners and they all use their own specific language, concepts, approaches and type of solutions. The issue with climate change is that various different types of disciplines have to be brought together. Therefore, climate change adaptation should not be seen as a new discipline but it should rather be integrated throughout all policy fields.

Another initiative that is currently active is the Climate Campus, this is a network of governmental agencies, educational and research institutes, entrepreneurs and societal initiatives. The Climate Campus works together towards a climate-proof IJssel Vechtdelta and aims to accelerate climate adaptation (Climate Campus, n.d.). The Climate Campus is used as a means to find better ways of collaboration between professionals and the community. Climate Campus is also involved in the implementation of the CATCH project in Zwolle. The following section illustrates how all these initiatives play a role in institutional capacity building in Zwolle.

4.2 Intellectual capital in Zwolle

As can be seen in the operational framework in Table 1, to build intellectual capital it is needed to: (1) provide training and education for professional development; (2) share and spread information to raise awareness and enhance broad support; (3) include various types of knowledge such as expert knowledge, technical knowledge and local knowledge and (4) question influential practices and beliefs in order to change governance culture and create opportunities towards creative alliances.

Education and training

Most interviewees agree that the cities and the partners that are involved in CATCH are relatively the frontrunners compared to cities not included in CATCH, because being in CATCH could be interpreted as an indication that the city has the capacity to take part in an international project which requires quite some investment already. The issue with smaller municipalities is that it is often more beneficial for them to hire expert knowledge temporarily, as an expert from the University of Twente who is involved in research around CATCH explains:

‘You cannot just simply train your staff for a certain period of time that should maybe be available for more urgent things that cannot be avoided. So, in that sense, there's still not so much priority given to increasing the knowledge and skills of the staff in the municipality ... especially for small municipalities, it is much easier, much more cost effective for them just to hire an external consultant’ (R1).

Although Zwolle has adequate expertise, a policy advisor from the waterboard emphasizes that the challenge is not to have a couple of experts but to make climate change adaptation inherent in all aspects of the own organization. This can be achieved by providing people with the right knowledge, for example through courses and trainings. In this regard, policy advisors from the province Overijssel are regularly invited for exchange opportunities between cities on the national level, for example with the Global Center on Adaptation in Groningen or Rotterdam.

Within the municipality Zwolle, the team Klimaatactief (climate active) provides road shows; they visit all departments within the municipality ranging from permits to real estate to discuss the topic of climate change adaptation. Team Klimaatactief then explains how the different departments can play their part in climate adaptation and advises them on how to start implementing new plans. The challenge that rises here has to do with capacity; currently there are too little people with expert knowledge and at the moment they are constantly being questioned by colleagues within the municipality.

Knowledge exchange

Based on this self-assessment in CATCH, an adaptation strategy can be formulated, of which a majority is already done by Zwolle within the ZAS. The province Overijssel also told the DPRA work regions about CATCH; that there is a European project on climate adaptation which is developing a decision-making tool and that they can get support from the University of Twente to start their self-assessment.

To go beyond that, the province of Overijssel wants to disseminate the knowledge from experiences in Enschede and Zwolle throughout the province. The province aims to facilitate other cities to learn from the pilots in Enschede and Zwolle and to eventually become more climate robust in its entirety. That is why CATCH plus programme was set up. As the communication advisor of the IJssel Vechtdelta elaborates:

‘We have to look closely at how we do things. Why do we do things the way we do them? What could we do better? That's very important and we should learn from and with each other, that is what the CATCH plus project is really all about; how we have always worked, and how could we actually do better? What can we learn from each other? So, I think evaluation is essential here’ (R6).

For sharing information, CATCH plus uses an already existing knowledge platform called ruimtelijkeadaptatie.nl which is related to the DPRA. On this website cities can share their lessons learned. Currently the first projects in Deventer, Haaksbergen and Oldenzaal are being discussed, the objective is to help these cities with their specific climate issues. These projects are mainly related to raising awareness. Furthermore, the Climate Campus also has the role of knowledge dissemination within the region. This means that the Climate Campus should develop knowledge within their network and pick up knowledge from other regions and translate it to the Zwolle region.

Diverse knowledge

The municipality tries to work in an inclusive manner by gathering knowledge from all kinds of sources. For example, by having projects together with the Hogeschool Windesheim and companies that look at design to make climate change adaptation more inclusive and more appealing or understandable for citizens and involve their knowledge as well. Citizen science is also an interesting phenomenon used. Citizens have their own experiences and can help collect data that is still missing in the models. Moreover, Zwolle has the *Natte Voetenkaart* (Wet Feet map), where people can report the nuisance in their neighborhood after a heavy shower. This information can then be checked, to find out if it matches the prediction in the models. Besides the *Natte Voetenkaart*, team *Klimaatactief* of the municipality Zwolle started a project called *Senshagen* in the neighborhood *Stadshagen*. *Senshagen* is an initiative to let residents gather information on temperature, water nuisance and environmental aspects. The aim of

this initiative is to see if it helps to raise awareness if people gather their own information, share this with each other and become more knowledgeable on these issues. The project is a collaboration with the KNMI and the RIVM and also provides relevant information for these parties to see what is happening in the neighborhood.

Zwolle has the benefit that it is a relatively big municipality within the province of Overijssel and it worked itself in the picture with regards to climate change adaptation. Therefore, there is a good network of (inter)national knowledge and data that the municipality can reach for. For instance, Zwolle has been the initiator of the city deal climate adaptation. City deal is part of the Agenda Stad (strengthening growth, innovation and liveability in Dutch cities). City deal started almost four years ago in Zwolle and there was a lot of knowledge exchange with cities such as Amsterdam, Rotterdam and The Hague, so that is something that has boosted Zwolle and that was very beneficial for the city. To maintain this position, the Climate Campus tries to create a knowledge network together with entrepreneurs, governmental agencies, research and educational institutions. Furthermore, the interviewees emphasized the importance of knowledge development within the region and think that Climate Campus could be very valuable in that aspect.

Innovation and learning

The conducted interviews show that for municipalities and other governmental organizations it is crucial to dedicate their rather limited resources to actually implementing projects. There is no budget or priority in terms of time and money for monitoring and evaluation in order to learn and also improve their processes. This limitation decreases the chances for learning and adapting. However multiple professionals do acknowledge the importance to set goals and to evaluate to eventually learn from both good and bad experiences and based on that, adapt the strategy.

The goal of CATCH is to improve this element of learning and evaluation by using a decision support tool. With this tool a city can do a self-assessment and see its current place on the road to become a water sensitive city. This also requires cities to evaluate their existing policies and strategies and to define points of improvements.

A lot of the interviewees argue that climate adaptation should become an inherent part of all developments within the city of Zwolle, this requires a change in governance culture. This is still seen as a big challenge, because there is also kind of a path dependency since a lot of people working for the municipality at the moment were trained in sectors whereas current students are taught with a more integrative mindset. It is often mentioned that Zwolle needs to make climate adaptation the 'new normal' in order to increase integration, policy advisor from the municipality elaborates:

‘You can have a couple of people who are immediately enthusiastic about climate adaptation challenges and an alderman who is enthusiastic and a city council who approves. But actually, the entire municipal apparatus has to work on this together. Everyone also has to start thinking about how I'm going to take on a new challenge? How do I take climate adaptation on board in time? How am I going to define the vulnerabilities?’ (R5).

Thus, to change the governance culture, a change with regards to the role of a civil servant is deemed necessary. To get as much stakeholders as possible involved and to really integrate climate adaptation in every project, the civil servant should be able to sell the story of climate change adaptation broadly. This means, moving from predominantly technical advice towards a more communicative and PR related approach. Therefore, Zwolle tries to create visibility so that people can see that things are happening, which is a big step in terms of engaging more people. Furthermore, the Climate Campus is creating two serious games. One is an escape room, which is described as a warm-up to start the conversation in a neighborhood and to encourage the residents to go and see what they can do in their own streets. That collectivity is also important there. When it comes to making the design, the second serious game comes in play. That game is based on the digital twin. With all the datasets currently available it is now possible to cast a city into a 3D model. So, with the second serious game participants are able to actually walk around the virtual city and add events (e.g. storms and droughts) to play with the future.

4.3 Social capital in Zwolle

Based on the operational framework in Table 1, to build social capital it is needed to: (1) strengthen the relationship between academia and citizens, between local and external people and between various generations and to include both public and private actors in decision-making; (2) increase mutual trust between institutions and formulate shared goals and (3) engage local communities and other relevant stakeholders and place emphasis on finding the local wants and needs.

Relational networks

Zwolle has a relatively strong network and is engaged on both the national and international level which can be seen through its involvement in several types of programmes. Therefore, the city is ahead of other mid-size cities with regards to climate change adaptation. Zwolle also has a climate adaptation team within the municipality, with people dedicating almost their full time and energy at local, regional, national and international level. Also, in CATCH multiple governmental institutions are involved, namely the seven participating municipalities, the province of Overijssel and Värmland in Sweden and the waterboard Vechtstromen who has the lead in the Interreg CATCH project. Moreover, the University of Twente and Hochschule Jade play a part in the connection with academia. In the discussions around the pilots, other stakeholders from the private sector were also included.

The Climate Campus aims to further establish and develop this knowledge network within the region by stimulating the cooperation between professionals and the community in the region. The Climate Campus created a minor Future Cities and Water Management at the Hogeschool Windesheim, to give students the opportunity to gain some practical experience and work together with private parties. The objective of this collaboration is to enthuse the next generation to work on climate change adaptation and to spread knowledge more broadly. As a communication advisor of IJssel Vechtdelta explains:

‘It is very good that these knowledge institutions are involved, not necessarily to build up knowledge, but all those students who are working on this subject take it with them in their careers, they take it home, to their own family, share it with friends and acquaintances. All this contributes to spreading of information about this topic’ (R6).

Furthermore, the Climate Campus reaches a couple of thousands of youngsters about issues related to climate change adaptation and the sustainable development goals through their networking activities. In a broader perspective the Climate Campus is focused on creating human capital, working together with young people and SME’s to create the needed knowledge and experiences and to connect people to the region.

Shared values

There is an awareness in Zwolle that climate resilience is no longer a government issue only. Interviewees argue that it is necessary to have a shared understanding of what the problems and ambitions are towards climate change adaptation. To understand what the upcoming challenges are and what the impacts might be, creates a sense of urgency. But even within the municipality not everyone has fully realized the importance of climate change adaptation. While the knowledge is there and available, there is still one more step to be taken to make climate adaptation completely evident in every project. To get there, having a shared understanding of the issue is crucial. Once there is a shared understanding of the issue, it will become easier to mobilize resources.

A lot of the property in Zwolle (around 60-70%) is privately owned either by citizens or companies. That is why the municipality must ensure the dialogue with the citizens and with the entrepreneurs to take them along and make them aware about the steps that need to be taken to become climate adaptive and that these should be taken collectively. Solving an issue in one place, shifts the problem to another place. As illustrated by the communication advisor of IJssel Vechtdelta:

‘If you really want to make an area climate adaptive you have to avoid the waterbed effect. That means if you put pressure on one spot, it will come up somewhere on the other side. The chain

is just as strong as its weakest link. If you take measures, then they should be taken over the full width of the area, otherwise you will get that waterbed effect' (R6).

For individuals it really starts with knowledge. People need to know what actually is happening with the climate, what the implications of climate change are for them personally and what they can do to prevent future issues. As the programme secretary of programma IJssel Vechtdelta said:

'Awareness plays a big part in this. People need to realize that they are at risk or must see climate change effects, like the droughts in de summer of 2018, and then if they are aware of the risks they might take action and invest in adaptation measures' (R4).

With the serious game that the Climate Campus is developing it is desired to raise awareness amongst citizens. The expectation is that the simulation will make it more clearly visible what the consequences of climate change are and how that will look like. Moreover, the municipality is in close contact with employers, business parks and housing corporation to increase their understanding of their vulnerabilities and to think together on how they can adapt their outdoor areas.

Community participation

Within the CATCH project, Zwolle is involved in a pilot related to awareness raising and community building which the municipality wants to link to their broader climate adaptation strategy. It has become clear that only raising dikes does not help against the expected weather events, so eventually measures will have to be taken on all scale levels within the city. As stated earlier, within the city 60-70% of the property is privately owned, therefore there is an increasing realization that all sorts of parties should be involved in the adaptation strategy. There is an awareness that the municipality is dependent on citizens to also take initiatives. Through CATCH the municipality is aiming to investigate how they can start this movement. They want to combine different types of measures that will involve citizens and involve the private sector. For example, the project Senshagen is not only helpful to gather data but also for citizens to get an insight in the issue and to bring it a bit closer to home for them. It is also a start of the conversation on the challenges that the area is facing.

Often initiatives only arise when there is a sense of urgency. Team Klimaatactief coaches and facilitates initiatives of third parties to ensure that their ideas will be brought to practice. The waterboard Drents Overijsselse Delta also wants to stimulate similar actions with their stimuleringsregeling (incentive scheme) which subsidizes groups of citizens with an initiative. The objective of this is to create an oil spill effect among citizens, to use the people who are already active on this case to make other people active. The policy advisor of the waterboard Drents Overijsselse Delta clarifies: 'Communication is part of the application. Publicity should be given to a project so that other people can look at it and think:

this is kind of interesting, I might want to do this as well' (R3). The biggest challenge however, is to convince private parties to invest in the liveability of their own location and to actively involve them in planning processes.

4.4 Political capital in Zwolle

To build political capital the operational framework in Table 1 shows that it is required to: (1) create leadership with a clear strategic vision and plans of action; (2) allocate work and personnel, exchange external services, find the connection between varying sorts and levels of organizations and resolve conflicts and (3) create or find enough time and financial resources to implement adaptive approaches.

Organizational leadership

Climate change adaptation is seen as the governments' responsibility, but there are different types of government organizations involved such as the waterboard, the province and the municipality. These different levels of government all have different responsibilities. The municipality of Zwolle has dedicated staff that works on climate change. Within Climate Campus the municipality has a clear, leading role. However, policy advisor from the waterboard Drents Overijsselse Delta notes: 'it would be a good thing if several parties steered this on the basis of the common objectives made in advance, because now the focus could perhaps shift a little bit towards Zwolle' (R3).

The interviewees think it is important that personnel is equipped to carry out these actions. This is related to financial resources but also to having a clear division of responsibilities. Zwolle has the capacity and the ambition to implement the ZAS and to become more climate resilient, since it is one of the frontrunners in the Netherlands and also represented internationally within the Interreg CATCH project. In the Interreg CATCH project, Zwolle has to report to the Waterboard Vechtstromen which is the overall lead partner and is responsible for the budget and end-result.

Nonetheless, the need for leadership is very much highlighted by the interviewees. There is need for people who are pushing this idea of climate change adaptation and become policy entrepreneurs. These policy entrepreneurs should have a strategic vision on where to go and they need to use these windows of opportunity to be more visible and to make this a high priority agenda item. Zwolle is lucky in this regard with their alderman Ed Anker, who has climate change in his portfolio, who recognizes the importance of the issue and is very decisive in his steering. But also, within the province, deputy Bert Boerman is very much active within all sort of national networks.

Mobilization capacity

Zwolle is already quite advanced in terms of thinking strategically, setting up plans, working with teams of dedicated people that are involved in climate change adaptation and also trying to allocate budgets to

specific climate change actions by bringing together funding from different sources on the national and regional level. Positioning themselves as one of the most active cities in the Netherlands also creates the opportunity to increase the capacity.

The IJssel Vechtdelta programme is seen as a success for a couple of reasons. On the one hand, the sense of urgency that came about as a result of the vulnerable position of the delta was a convincing reason to start working on the theme of climate adaptation. Next to that, there was enough budget made available by the province Overijssel to start up projects and create more visibility for climate adaptation measures. Finally, a good mix of parties were involved; not too much and not too little and there was a good working atmosphere among the parties. As programme secretary of IJssel Vechtdelta told:

‘If there is a good energy within the group, things will come together. So, I think that is important, that there are always a few people who really want to go for it within such a group. I think that is one of the reasons why a project or a programme succeeds or not’ (R4).

Resources

Another finding in CATCH is that especially small or mid-sized cities are heavily dependent on higher levels. They look for funding and connections but this can result in finding funding for multiple projects or pilots separately which makes it difficult to really integrate the objectives. Funding does not necessarily come from external parties. Budgets also come from within the organization itself. With regards to funding a statement was made by the University of Twente researcher:

‘It is always an obstacle to have enough funding and that has to do with the 'business model'. Because, for instance, in energy transition, when somebody installs solar panels on their roof, it is known already in how many years it will pay back and how much they can sell back to the grid because they do not need all the energy they produce. So, there is a business model that pays off. With climate change adaptation, it does not exist. I think it was one of the main findings also of our assessment with the cities of CATCH that they need, they want to know more. What is the benefit? How can they also convince them to invest? So that they can prevent or decrease future damage’ (R1).

However, Zwolle is in a relatively good position in this regard. The municipality has climate change adaptation as a priority on the agenda, therefore a lot of money has been made available. For the projects in the IJssel Vechtdelta programme the province Overijssel invested 14 million euros. The question is however if these investments are enough to become climate robust by 2050? Most of the interviewees think not yet. But it is a good way to start. Therefore, they advocate for integration of climate adaptation measures in all projects throughout the municipality. One aspect that is also important here is financial

innovation. Finances are now organized in such a way that each department or project has different budgets or cash flows, this hampers the integration.

Lastly, Zwolle is a fast-growing city with a lot of developments going on. The municipality is expecting a growth from 124.000 to 140.000 inhabitants within the coming ten years and even up to 170.000 inhabitants after that. Within these developments it is crucial to take climate adaptation already into account. But to manage this properly there should be sufficient resources not only in terms of money but also in terms of manpower. In Zwolle this is still relatively doable although there is a high pressure on some people.

To summarize this analysis, the key observations are filled in Table 6 below.

	Key observations	
	Strengths	Weaknesses
Intellectual capital	<ul style="list-style-type: none"> • Through CATCH plus and the Climate Campus knowledge is exchanged within the region. • Zwolle is in a good network and has access to (inter)national knowledge and data. • The municipality Zwolle gathers local knowledge through citizen science. 	<ul style="list-style-type: none"> • Having some experts is not enough, Zwolle is in need of more trained professionals with regards to climate adaptation. • Work is done project by project and there is little priority for learning and improving planning processes. • There is need for a change in the role of the civil servant. • Integrating climate adaptation is still an issue in Zwolle.
Social capital	<ul style="list-style-type: none"> • Zwolle has a strong network and is engaged in various programmes on the national as well as the international level. • There is an increasing awareness in Zwolle that climate resilience is no longer only a government issue. 	<ul style="list-style-type: none"> • There is need for a shared understanding with also private stakeholders of the upcoming challenges and the division of responsibilities. • The biggest challenge in Zwolle is to involve private parties in the decision-making process.

<p>Political capital</p>	<ul style="list-style-type: none"> • The need for a policy entrepreneur with a strategic vision is highly emphasized, Zwolle is very successful in this regard. • Zwolle has a high mobilization capacity, is strategically strong, it allocates budgets to climate change adaptation specifically and it positions itself as a frontrunner on different scale levels. • Climate change adaptation is high on the agenda in the municipality of Zwolle and Province of Overijssel so relatively much money has been made available. 	<ul style="list-style-type: none"> • There is need for financial innovation in order to allow more integration of adaptive measures in spatial developments.
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Table 6: Summary results data analysis

Chapter 5: Conclusion and discussion

It is generally agreed upon that cities are facing increased flood risks as a consequence of climate change and ongoing urbanization, and that traditional urban water management is unable to deal with the complexity of this issue. Therefore, many cities are aiming to become flood resilient. However, the transition to urban flood resilience appears to be challenging. Especially midsize cities are vulnerable as they are relatively dependent on their region and have less manpower. There are a couple of institutional barriers that impede the transition to urban flood resilience such as inflexibility, working in silos and little stakeholder engagement. Institutional capacity building is proposed as a concept to overcome these institutional barriers. Therefore, this research aims to answer the main research question: ‘How can midsize cities build institutional capacity needed to transition to urban flood resilience?’

The first step in this research was to define both urban flood resilience and institutional capacity building, followed by the operationalization of institutional capacity building for water governance. This was done by means of literature study and a systematic literature review. This resulted in an operational framework for institutional capacity building for water governance (see Table 1). Subsequently, this operational framework was used in the case study of Zwolle to assess how Zwolle is building institutional capacity to become a water sensitive city.

In this chapter the final link will be made between the theoretical framework and the key observations made in Zwolle (see Table 6). There will be a review of each capital on how Zwolle is doing with regards to institutional capacity building. This results in recommendations specifically for Zwolle to further build institutional capacity. After this, there will be a reflection of both the content and the process of this research. To finalize this thesis, suggestions for further research will be made so that the operational framework for water governance can be further refined and used by other midsize cities.

5.1 Strengths and weaknesses with regards to institutional capacity building in Zwolle

In the literature three dimensions (intellectual, social and political) of institutional capacity are described (Healey, 1998; Restemeyer et al., 2015). In this section the strengths and weaknesses of Zwolle with regards to these three dimensions will be discussed.

5.1.1 Intellectual capital

Throughout this research the criteria: education and training, knowledge exchange, diverse knowledge and innovation and learning are proposed to build intellectual capital. A challenge that Zevenbergen et al. (2018) recognized is that knowledge often remains centralized and exclusive, which is also visible in Zwolle. While Zwolle is in a relatively good position compared to other midsize cities and does have internal expert knowledge, the dissemination of this expert knowledge throughout the organization

remains challenging. Climate change adaptation should become an inherent part of planning processes, but to achieve that Zwolle has too little trained professionals. Providing courses and training could be helpful to properly equip personnel (van de Meene et al., 2009; Peng, 2013). In addition, a value which is in need of change is the role of civil servants, to achieve this there should be more focus on people who work more like salesmen and know how to spread the story of climate change adaptation widely.

Besides this, Dany et al. (2015) argue that it is essential to have solid information to advice policies and implementation. This entails more than just expert knowledge and specifically emphasizes local knowledge since including local stakeholders empowers them to contribute and to share their specific knowledge, information and values (Wolsink, 2010). In this respect Zwolle is doing very well. The municipality Zwolle uses citizen science initiatives to collect local knowledge. Moreover, the city has worked itself in the picture with regards to climate change adaptation and has access to a network of (inter)national knowledge and data. Dissemination of this knowledge throughout the region is highly valued. However, this has not always been a priority to governmental organizations as they often have limited resources. Therefore, these organizations are frequently reinventing the wheel as they work on a project base with little room for learning and improving planning processes. In CATCH the aim is to really improve on the learning and evaluation elements. With the decision support tool, cities can evaluate their current state and define points of improvement to become a water sensitive city. Within this tool participating cities, like Zwolle, can share lessons. CATCH plus aims to increase and stimulate learning between cities in Overijssel. Furthermore, the Climate Campus functions as a knowledge network that collects external knowledge but should also stimulate knowledge development within the region.

In Zwolle, the integration of climate change adaptation into policy reveals the inflexibility of institutions. The utilities, the infrastructure and the way in which institutions have been organized up until now, cannot easily be adapted. As Gupta et al. (2010, p.460) argue: 'all institutions embed a degree of robustness and resistance to change'. The problem with climate change related issues is that all kinds of disciplines have to be brought together, while they currently work in silos. To bring various disciplines together, Sørensen et al. (2016) propose an adaptive and integrative approach where sustainability is inherently embedded. That is in line with the ambition of Zwolle to not have climate change adaptation as a separate policy field but integrated throughout all disciplines within the municipality. Furthermore, Lamoree & Harlin (2002) argue that institutional capacity building requires built in flexibility in order to adapt to continuously changing external processes. To ensure this, the municipality wants to define periods of five years up until 2050 to create a moment to evaluate and adjust.

Besides integration another issue that was often mentioned was fragmentation. The downside of having multiple programs and multiple levels of governments is that all these entities have different administrative borders. The DPRA-work regions, the safety regions, the waterboards, the province and the municipality all encompass different, partly overlapping, areas. That makes it difficult to create integrative plans.

5.1.2 Social capital

Building social capital demands a local and collaborative approach which focuses on empowerment and not solely informing (Restemeyer et al., 2015). In this research the criteria relational networks, shared values and community participation are proposed to build social capital. To have a strong relational network means to strengthen the relationship between all different kind of stakeholders both public and private and to include these stakeholders in the decision-making process (Peng, 2013; Lamoree & Harlin, 2002). In this respect, Zwolle is very active and this is highly valued by the interviewees. Zwolle is strongly embedded in both national and international networks through various programmes.

The right circumstances for institutional change to occur arise through dissemination of information, dialogue and engaging with stakeholders (Lamoree & Harlin, 2002). In this regard, community participation has become increasingly important. In Zwolle, 60% of the property is privately owned, thus the municipality is highly dependent on citizens to also participate in climate change adaptation activities on their own properties. The added value of this, according to Breeveld et al. (2013) is that it puts more emphasis on local wants and needs and helps to identify crucial areas sooner. Through CATCH the municipality is developing serious games to involve local communities and to raise awareness. However, it is still challenging to actively engage communities throughout the decision-making process. That is why the municipality must ensure the dialogue with the citizens and with the entrepreneurs to take steps collectively. In the end, the goal is to have a shared understanding what the problem is and what the ambition is and how the responsibilities are divided.

5.1.3 Political capital

Political capital entails leadership and policy entrepreneurs who advocate change and financial resources for adaptation measures (Restemeyer et al., 2015). This research uses the following criteria to build political capital: organizational leadership, mobilization capacity and resources. Leadership from change agents, that inspires and motivates staff, has proven to be very valuable (van de Meene et al., 2009; Restemeyer et al., 2015). Next to that a clear strategic vision is needed (van de Meene et al., 2009). The strategic vision in the case of Zwolle is the ZAS, which aims to become a climate resilient city by 2050. The need for leadership is very much highlighted in the case of Zwolle. There is need for people who are pushing this idea of climate change adaptation on the agenda and who are using windows of

opportunity to create visibility for the issue at hand. Zwolle is doing well in this regard with alderman Ed Anker who acts as a policy entrepreneur in the field of climate change adaptation.

Institutions that have mobilization capacity are equipped to: tackle the allocation of work, exchange external services, find the connection between varying sorts and levels of organizations, resolve conflicts and have properly equipped and allocated personnel (Jonsson & Wilik, 2014; Lamoree & Harlin, 2002). Because of its positioning on the theme of climate change adaptation Zwolle is already quite advanced in terms of developing strategies and allocating human resources and funding to climate change adaptation. However, policy advisors from the province and waterboard recognize that this is definitely an issue in other midsize cities in the region. Besides allocating funds, the challenge is to find financial resources, this is essential for institutional capacity building (Albrecht et al., 2018). Again, because Zwolle has highly prioritized climate change adaptation, a lot of money was made available. However, the interviewees do not think it is enough yet, and advocate for integration of climate change adaptation in all future developments. This also raises attention to the need for financial innovation. Currently, having all sectoral budgets impedes integration. Another challenge that Zwolle is facing is its fast growth. There is already a high pressure on some people to deal with all projects that are in need of advice on climate change adaptation.

5.2 Recommendations for institutional capacity building in Zwolle

Based on this conclusion, this section proposes recommendations for institutional capacity building for water governance in Zwolle. These recommendations cannot be generalized for all midsize cities as they are the result of one specific case study. Nevertheless, other midsize cities can learn from a case like Zwolle as it is one of the frontrunners in the Netherlands. If another city wants to become flood resilient and is in need of a new, adaptive water governance approach, the criteria in this research must be considered. Thus, planners in other mid-size cities can use the operational framework in Table 1 as a tool to assess and evaluate how they are building institutional capacity. The recommendations for institutional capacity building in Zwolle are:

- Disseminate knowledge throughout the municipal organization and the region

First, it is important to spread expert knowledge throughout the organization in order to create sufficient capacity to make climate adaptation inherent in decision-making processes. Furthermore, it is suggested to improve evaluation of previous and ongoing projects to learn from them and to create what Gupta et al. (2010) call institutional memory. At the moment, there are many initiatives but the experiences and lessons learned are not salvaged. Both CATCH plus and the Climate Campus can be used to further increase this spreading of knowledge and experiences. Eventually, this will lead to better decision-making processes.

- Invest in a new type of civil servants

In order to increase stakeholder engagement and collect knowledge from a variety of sources, there is need for a new, more communicative type of civil servant. Besides expert knowledge, the civil servant should be able to broadly advocate the story of climate adaptation and increase stakeholder engagement. Investments in this new type of civil servants can be done by providing education and training. This should allow civil servants to develop a specific, tailor-made set of skills that is deemed necessary.

- Include and activate private stakeholders

Currently, community participation in Zwolle is mainly focused on informing and awareness raising. However, to build institutional capacity building citizens and companies should be actively involved in decision-making. Private stakeholders are also required to take action on their own property. Therefore, private stakeholders should be included and actively play part in the development of plans from the start.

- Integrate climate adaptation in future developments

As Zwolle is a fast-growing city, a lot is being developed. Therefore, climate adaptation measures should be integrated in all urban planning projects from the beginning. This is called mainstreaming of climate change adaptation (Uittenbroek et al., 2013). Here it would also be beneficial to allow more integration of jars of money between sectors.

5.3 Discussion

5.3.1 Theoretical reflection

The theories that were most relevant in this research are the water sensitive city, urban flood resilience and institutional capacity building. The water sensitive city theory was merely used to set the stage and to clarify the connection with Interreg CATCH. Institutional capacity building theory and a systematic literature review on institutional capacity in water governance literature were used to create the operational framework that was central to this research. This operational framework was created for the operationalization of institutional capacity building for water governance and was a useful tool to analyze the current state of urban water management in Zwolle.

As the selection of articles for the systematic literature review was based on the criteria ‘institutional capacity’, ‘institutional capital’ and ‘water’ not all articles that were used to create the operational framework were on urban flood resilience. Therefore, it is not possible to state that the operationalization of institutional capacity building in Chapter 2 is specifically for the transition to urban flood resilience. However, the operationalization does include multiple criteria that are necessary to build institutional capacity in order to change to a new, adaptive water governance approach which is needed to eventually transition to urban flood resilience.

The main reason to conduct a systematic literature review was that little was known about what institutional capacity building meant for the transition to urban flood resilience. Still, defining the criteria as a result of the systematic literature review was rather challenging. Some articles used very fuzzy concepts and definitions, this led to 61 codes that needed to be filtered and merged. Nevertheless, an operational framework that was close to complete could be created. One issue that did not show up in the systematic literature review and did in the case study was that of physical fragmentation along administrative borders. In the theories used in this research, integration related mainly to sectors within an organization.

5.3.2 Methodological reflection

The case for this research, Zwolle, was carefully selected because it was part of Interreg CATCH and because the city is already fairly active on climate change adaptation. Within the Netherlands another case that could be interesting is Enschede which is also a pilot city in Interreg CATCH. For this research it was very useful to study a case that has a frontrunner position like Zwolle has, because the people working there are very involved and have up to date knowledge which allowed to test the operational framework. However, it is hard to generalize the results of this research because it is based on solely one case and a city that is really ahead on the topic of climate change adaptation compared to other cities.

The systematic literature review was done carefully. Every step that is taken up until the selection of the 21 articles has been documented. When coding the articles, it is challenging to be fully objective. Although every choice was based on earlier literature research there is still some room for personal interpretation. Also, because it was the first time conducting a systematic literature review, there was an increase in understanding with every article. To get a more objective review it is suggested to code all articles again or to have another person to code the articles as well and discuss each other's results (cf. Verweij & Trell, 2019). Moreover, one shortcoming of Scopus was found when realizing that the article of Restemeyer et al. (2015) was not in the article selection. Then it became clear that not all articles that were intended to be part of the selection were selected. Only the articles with institutional capacity or institutional capital in the title, abstract or keywords were selected. This means that the selection is not completely foolproof. Another note that has to be made with regards to the articles selected for the systematic literature review is that they are often written in a totally different context compared to the Dutch, such as: Cambodia, Taiwan, South Africa, Vietnam etcetera. It is important to take this into account when translating suggestions from these articles to the Dutch context. Furthermore, there might be issues that are not present in those contexts but are in the Dutch context and these are then easily overlooked. Therefore, it is useful to conduct semi-structured interviews, this allows interviewees to speak freely and to raise any issues that are at hand.

The data collection through semi-structured interviews went very well. At the start of the COVID-19 outbreak there was a bit of a concern if the data could still be selected but all interviewees were very accommodating and flexible. Content wise it could be argued that a complete picture was formed as you could speak of saturation during the last interview. One group that was intended to be interviewed but did not succeed was the community, to get an insight in how they perceive and experience the governmental initiatives. This could still be added.

5.3.3 Contribution to planning theory

Cities are struggling with the implementation of flood resilience, therefore Restemeyer et al. (2015) already proposed institutional capacity building as a means to stimulate implementation. In this research a systematic literature review on institutional capacity in water management literature was conducted to get a better understanding of how these two concepts relate. As there is little and also quite dated literature (e.g. Healey, 1998 and Khakee, 2002) on institutional capacity building, an overview of the current state of the debate is provided. Furthermore, institutional capacity building was operationalized for water governance in an operational framework (Table 1). Thus, the main contribution to planning theory of this research was to translate rather fuzzy literature into an operational framework that midsize cities, that currently feel locked-in in the transition to urban flood resilience, can use as a tool to assess how they are building institutional capacity and as a guideline how they can further build institutional capacity.

5.3.4 Suggestions for further research

The first and foremost suggestion for further research is to study more midsize cities, to test the operational framework and to be able to make better generalizations. It would be interesting to compare the results for other pilot cities in CATCH (plus), as well as less ‘active’ cities that are not part of a large international project. It would be interesting to see how those cities are building institutional capacity. Based on this it is also may be possible to see if cities that participate within CATCH or CATCH plus actually learn from each other and how the tools used in CATCH (plus) contribute to this policy learning.

Other suggestions for further research would be to select another, more complete, group of literature for the systematic literature review to see if critical elements were overlooked in this research. Also, coding the articles for the systematic literature review together could improve the objectivity but also the overview of all concepts and definitions. Furthermore, it would be valuable to also interview private stakeholders from the community to see how they are experiencing their role and responsibilities.

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Appendix A

The syntax used to get to these 100 documents in Scopus:

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23870346)) AND (TITLE-ABS-KEY ("institutional capa*" OR "institutional capi*")) AND TITLE-ABS-KEY ("water")

Appendix B

Interview guide

Start

- Introduce myself
- Explain aim of this research
- Ask permission to record the interview

Background

- First, can you shortly introduce yourself? What is your role and background?
- What is your contribution to the CATCH project and/or the ZAS (zwolse adaptatie strategie)?

Case

- Can you elaborate on the current flood risk strategy in Zwolle? What are the biggest issues?
- What are the aims and ambitions regarding flood risk management in Zwolle?
- How do you want to achieve these? And how does the CATCH pilot contribute to that?
- How do the pilot and the ZAS contribute to the flood resilience in Zwolle? What measures are taken? (Interpretation and examples)

In the literature institutional capacity building as a means to stimulate the transition to flood resilience, consists of three aspects: intellectual, social and political capital.

Institutional capacity building

- What do you think is crucial in the governance of flood risk management?
- Is there room (or need) for adaptability and flexibility? (Examples)

Intellectual capacity

- Is there enough expert knowledge available? Is learning being stimulated?
- Is there room for continuous processes of learning and evaluation during the process?
- Are diverse knowledge sources taken in consideration?
- Are there examples of experiments which were innovative and contributed to new knowledge?

Social capital

- Who are the public and private stakeholders involved in this project? Who is responsible for what? (How are the inter- & intraorganizational relations?)
- Are the decisions made broadly supported by all stakeholders? Is there mutual trust amongst all stakeholders? Are doubts being discussed?
- Is there room for community participation?

Political capital

- How are the relations between leaders/politicians and the project organisation? Is there a clear strategic direction and how is this organized? Is there room for deliberation, negotiation and consensus-building?
- Is it possible or manageable to have the right people working in the right place?
- Are there sufficient financial resources?
- Are there any strong leaders? Or a strong leading party?

Closing

- What aspects do you think are most important to build institutional capacity? And what is needed to make the ZAS successful?
- If you evaluate the process up until now, what went really well and what can be improved on?
- Who do you think I should interview to get the full picture?