

The contribution of new real estate in a transition towards more resilience

A case study on climate adaptation in the Zwolle region

J.P.J. Mangnus (Jesse)

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Student

J.P.J. Mangnus (Jesse)

Student number: S4751248

Supervisor Radboud University

Dr. A.J. Calo (Adam)

Supervisor Province Overijssel

G.J. Hoogendoorn (Dianne)

B. Groot (Bert)

Preface

I would like to take this opportunity to thank the people who made this thesis possible. Firstly, thank you to all the respondents who participated in the interviews. Next, I would like to thank my supervisors Adam, Dianne and Bert.

Summary

The climate risks that the region of Zwolle is facing are multiple, representing the climatic risks the Netherlands are facing as a whole: pluvial flooding, coastal flooding, land subsidence. Complicating governments to manage these climate change risks is the increasing demand for more new-build housing due to the housing shortages. The main concern is that the focus on climate adaptation and water safety is diminished by the focus on accelerated construction of new dwellings. The increasing awareness of risks is central to Beck's (1999) Risk society theory, which aims to expose the deeper meaning of climate risks. The practical implications of this are analysed according to the Star-flood model (Kaufmann et al., 2016) which is aimed at the diversification of flood risk management strategies. The Zwolle region will be the guiding case, more than once referred to as holland in miniature when it comes to climate risks. This leads to the following research question: *“How can new urban development contribute to more climate resilience for the region of Zwolle?”* First of all, smarter designs of urban exploitations and integral collaboration in an early state between all actors involved are the first step forward. The guiding paradigm should be that new brownfield developments should at all times contribute to improving the existing urban situation regarding climate adaptation. On the one hand, the subsoil and the water system should become guiding factors in the function and design of the development taking place on a location. On the other hand, developments should help reducing problems such as heat stress or pluvial flooding in the adjacent urban area. To actually achieve this some additional interventions on management level are acquired. The national government has to take a more leading and central role to overcome regional disputes. Besides that, the water authorities have to take a more prominent role when it comes to spatial planning which is more and more integrated to water management. To give a far-reaching and slow transition like this a good chance of success, it is important to tell the right narrative. A narrative that resonates with all actors and is told in the right 'language'. Such a narrative ensures that factors such as existing interests, a lack of ownership, and compartmentalisation among governments hinder this transition.

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1. Introduction

The Netherlands has been plagued by a persistent housing shortage for several years. As agreed upon by the Dutch minister of housing and spatial planning, the current shortage of dwellings counts up to 279.000 dwellings (Primos, 2021; Ministry of VRO, 2022). Where previously the idea was that the Dutch housing market would not expand any longer, this idea has been abandoned in recent years. As a result, the Ministry of Housing, Spatial Planning and the Environment, which was abolished in 2008, was recently re-established. The minister stated the following regarding the Dutch housing market; 'The idea that the Netherlands was 'finished' ten years ago and that there was no need for national spatial planning anymore. Large and urgent tasks - such as climate change, nature conservation and sufficient and affordable housing - mean that the Netherlands is on the eve of a major rebuilding of its national infrastructure (Ministry of internal affairs, 2022, P.2).'

Besides the idea that the national government is trying to take more control of the housing market by making financial resources available, more and more critics argue that more direction may also be needed when it comes to the location and design of new buildings (Kaufman et al., 2016; Sweco, 2021-a). This is due to the fact that in addition to the problems on the housing market, the Netherlands is expected to face another major problem in the near future: climate change. Residential real estate is supposed to last for 50 up to a 100 years, however in practice the lifespan can reach over a 150 years. Which means that these investments will definitely have to deal with the long-term effects of climate change. In order to limit damage from climate change and, moreover, to prevent the houses we are building now from having to be rebuilt within a few decades. Because climate change could happen faster or differently than expected, we need to anticipate this when designing new residential buildings (Sweco, 2021-a). It is not solely about the design of the buildings, but the design of the landscape and the choice of location is relevant as well. For example; municipalities are increasingly diverting to areas that are vulnerable to fluvial flooding or high water. The number of new houses built in the Rhine and Meuse riverbeds increased from almost 55000 to over 70000 in the period 2000 to 2019 (CBL et al., 2020).

Fluvial flooding is not the only effect of climate change that is threatening residential real estate. Coastal flooding, pluvial flooding, drought, heat, land subsidence are effects of climate change that are directly or indirectly affecting residential real estate (Kaufmann et al., 2016; Sweco, 2021-a). In the context of the housing challenge, it is important to make the Netherlands climate-proof and water-resistant. Risks of flooding and drought for our current cities and the new houses to be built must not increase, despite climate change (Ministry of internal affairs, 2022, P.19). When it comes to the development of new real estate, there are various ways to mitigate the negative effects of climate change. The Netherlands have a long tradition of flood defence, through building dams and dykes for example, however all other strategies are present as well. The Starflood-program based on flood risk management in six different European countries distinguishes five different flood risk management strategies as shown in figure 6. (Kaufmann et al., 2016). Urban agglomerations, urban areas and regions vulnerable to flooding will be more resilient, if multiple Flood Risk Management Strategies (FRMS's) are implemented simultaneously and are aligned. Successful implementation requires a proper coordination and institutional embedding (Beyers, n.d.). After the high water levels in 1993 and 1995, the Room for the River project was initiated, which led to a relative diversification of flood risk strategies. However, nowadays the familiar flood defence by raising the dikes is assumed to become dominant again (Rijkswaterstaat, 2020). This trend combined with the growing numbers of outer dyke developments seem to contradict the need to counter the negative effects of climate change.

The flood risk situation in the Netherlands can be characterised as a low probability, but high impact situation. It is traditionally the responsibility of functionally decentralised and specialised water management authorities, so that flood management is relatively independent of political whims (Kaufmann et al., 2016, P.6). The focus on lowering the probability of flooding is not incongruous since 59% of the Netherlands is susceptible to flooding. In addition, the most important areas in terms of economic activity are situated either below sea level or in flood risk zones. This means that in cases of major flooding, the consequences might be disastrous. The lack of effective preventive, mitigative and responsive strategies ensures that the damage potential remains rather high. Depending on the scale of the damage, compensation is delayed or impossible, which could cause a delay in recovery and a marked disturbance of economic activity. A lack of awareness and communicated risks could create inadequate reactions among citizens who may be a victim of future flood events. Therefore the integration of spatial planning and flood risk management and the implementation of prevention and mitigation strategies in spatial planning should be strengthened, to enlarge safety on the one hand and to prevent high costs as a result of future damage on the other hand. These costs are assumed to increase exponentially in the future as shock events become more frequent and severe. This means that the flood probability of flood defence mechanisms is increasing. As well as the associated damage and suffering (Kaufmann et al., 2016).

Meanwhile, we have reached a point where the realisation has come that spatial developments need more guidance from the government because several major transitions and events are on the horizon. In addition to a wide range of challenges, this also provides opportunities for integrated problem solving. However, this requires more effort and in some cases more costs at an earlier stage. Hence the following message from the ministry: In the reappraisal of national spatial policy, water and underground will once again be more of a guiding principle for all spatial plans. This has not been the case in a long time. Out of an age-old belief in the malleability of the land, and aided by the advantages of technology, the landscape and the water system have been completely manipulated. This has brought much but the ill effects of this can no longer be denied: flooding, subsidence, desiccation, soil and water pollution, heat stress and biodiversity loss, exacerbated by climate change (Ministry of internal affairs, 2022, P.6). These ill effects are subject to the theory of risk society (Beck, 1992). Beck suggests that we are in a transition towards a risk society where it is no longer about the distribution of goods or wealth but more about the distribution of risks. Beck's risk society theory will provide insights in the deeper meaning of risk and combined with the Star-flood model of Kaufmann et al. (2016) it will form the theoretical backbone of this study.

Research problem

The Netherlands is embarking on an ambitious period of intensive housing development amidst increasing flood risk. A million new homes are needed in the already limited space. In addition, there are various issues in terms of water safety and nature conservation that are often already a bottleneck for local governments. These various interests come into conflict more than once, partly because the population of the Netherlands is expected to keep growing until 2050. On top of this, climate change is likely to further exacerbate current problems when it comes to drought, floods et cetera. The prevailing problems are facing the region of Zwolle as well. On the one hand the region of Zwolle is in need for more residential real estate and desires to expand and to retain its quality. On the other hand, the region of Zwolle is often referred to as 'The Netherlands in miniature', because all climate risks that the country is facing as a whole, are present in the region as well. In a transition to both counter the negative externalities of climate change and serve the growing demand of residential and economical real estate, the claim on space is still increasing. The research problem in this thesis is mainly this ever-growing claim on the available space in the city combined with future risks that might be threatening the liveability in the area.

Research aim

The main aim of this research is to uncover where resistance towards the transition in which the underground and water become more relevant in spatial developments. To achieve this, in-depth insights will first be provided on climate risks in the region and how they relate to spatial planning and urban development. Resistance in the actors involved will also be identified. Once this resistance is revealed, recommendations can be made on how to improve the overall resilience in the region.

Research questions

Considering the various negative impacts of climate change that the region of Zwolle will face it is important to prepare new urban developments. In the development of new real estate the creation of resilience should be incorporated more. Therefore, the main question of this study is composed as follows;

How can new urban development contribute to more climate resilience for the region of Zwolle?

To enable this research to answer the main research question, several sub research questions have been developed to provide more in depth insights on the research problem.

What are the climate risks for the Zwolle region?

How do growing demand for housing and increasing climate risks relate to each other in the Zwolle region?

In what way can different flood risk management strategies be more integrated in the region Zwolle?

How is the responsibility for a resilient region distributed among the different actors involved, and how is this system managed?

Is there any obstruction in the region to the transition towards a system that is regulated by water and underground?

Societal relevance

The region of Zwolle is assumed to expand for the coming decade. The objective is to realise an amount of 1000 new built dwellings annually until 2030. This should be enough to cover the current shortages and also fulfil the expected future demand (Municipality of Zwolle, 2021). Since the conflicting claims on public spaces, the realisation of new residential real estate is not proceeding as rapidly as hoped. Therefore the societal relevance of this research is partly covered by the contribution on accelerating the realisation of new dwellings to combat the housing shortage. Besides the problems on the housing market, the region of Zwolle is also assumed to face problems that are due to the effects of climate change. These problems both require a larger claim on space. The problem, however, is that the two claims should not be in conflict with each other. As stated in the introduction, the Netherlands is well known for its focus on flood defence. However, people are finding out more and more that social engineering cannot always provide a suitable solution. Therefore this research contributes to the question how the different strategies of flood risk management can be better integrated in the region of Zwolle. The insights of this research benefits the inhabitants of the region because of the assumption that on the longer term, the further inclusion of various flood risk management strategies in developments is providing more resilience to the region. This means that the probability of flooding and the negative effects of it will decrease.

Besides the strong emphasis on including proactive spatial planning in developing new residential real estates, this research focusses on the other strategies of flood risk management as well. Since this research attempts to provide insights into how these strategies can be better integrated both the

region and its inhabitants are assumed to benefit. All flood risk management strategies are intended to increase the resilience and liveability of the area which will lower the risk of flood events and its negative externalities.

Scientific relevance

In scientific literature much has been written on climate adaptation. The framework that has been used most frequently is on multi-level safety (Stowa, 2014). However, since there is a rising demand for a more diverse approach on flood management the Star-flood framework has been developed (Bakker et al., 2016; Kaufman et al., 2016; Kaufman 2022). Multi-level safety has been a very familiar framework which is used by governments to shape their policies on safety, in particular their flood risk management. However, the Star-flood model is a more comprehensive version of the Multi-level governance model that is assumed to fit current reality better. The use of the star-flood model can contribute to the scientific literature by placing the model alongside empirical reality. This tests the usability of the framework.

After the covid pandemic various older theories on the risk society have been becoming relevant again after they were increasingly faded into oblivion (Beck, 1992; Beck 1999; Giddens, 1999). As risks and susceptibility to extreme weather events increase, it becomes more relevant from a scientific point of view to apply these risk theories to changing climate-related conditions. Herein lies the other part of the scientific relevance of this study. Whereas risk society theory reflects to risk on a deeper societal level, the Starflood theory is applied at a more practical managerial level of risk. In the combining of these two theories in current case lies the scientific relevance.

2. Theoretical framework

This chapter will explain the theories and backgrounds that are necessary and useful in answering the main and sub-questions already identified. Firstly, the backgrounds and frameworks will be outlined with regard to Dutch flood risk management and its connection to climate change. Next, risk as a concept will be discussed in more detail. Risk is quite an abstract concept that is treated differently by different theoretical frameworks. In addition, the definition of risk is important to further function in this research. Risk as in flood risk and climate risks together with the drive to urbanise are the central elements in this thesis. To prepare the region for such risks, the term resilience is often returned. However, what this means for climate adaptation and what definition belongs to it is not obvious. The concept of resilience can be explained in more concrete terms using the widely used multi-safety model. However, this multi-safety model will be further expanded in this thesis as the Starflood model. Finally, policy arrangement theory will be discussed. This theory will be central when it comes to structuring the interviews and the analysis of the data.

2.1 Dutch flood risk management

Regarding purely the physical aspects of the soil and ground of the Netherlands, it is probably the most flood prone area in the whole of Europe. This is partly due to the extensive coastline and partly to its location in the delta of various rivers such as the Meuse, Scheldt, Rhine and IJssel. In addition, 26% of the Netherlands lies below sea level and 55% is vulnerable to flooding as shown in figure 1. However, taking its flood risk management into account makes it one of the safest countries when it comes to flood defence. (Wiering, 2019; Pbl, 2022; Kaufmann et al., 2016). Decentralised and specialised water management authorities are traditionally responsible for flood management which makes it relatively independent to political whims. The water system governance arrangement is the most institutionalised and hegemonic. It includes the flood defence strategy and is characterised by governmental accountability, legal safety standards for dikes, specialised regional and

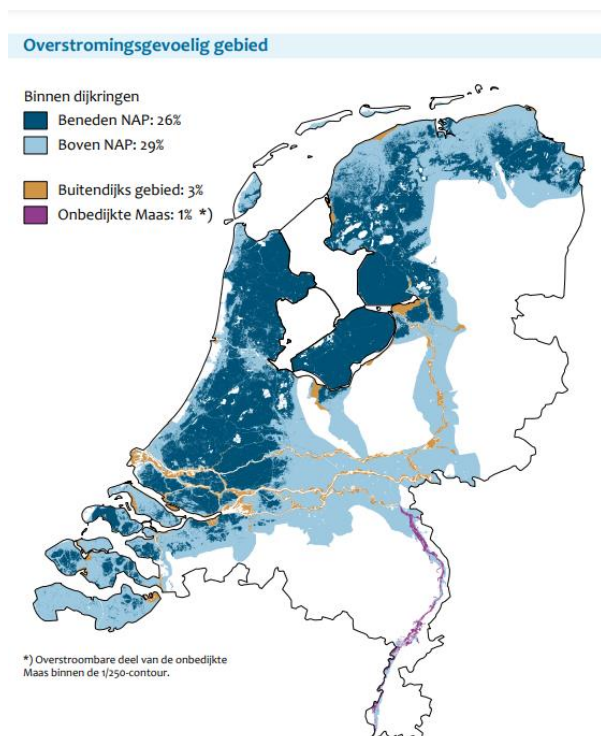


Figure 1 Flood prone areas (PBL, 2022)

national water authorities with detailed knowledge and, as far as regional water authorities are concerned, financially powerful positions (Kaufmann et al., 2016, P.8). The flood risk management is characterized by a strong emphasis on flood defence which can partly be explained by the high impact situation in case of a flood event. Therefore the risk situation in the Netherlands can be characterised as low probability but high impact. Climate change and an increasing pressure on the collective public system are gradually changing the focus on flood defence towards a more diverse flood risk management strategy (Wiering, 2019).

Governance

In the Netherlands there is a legal obligation for the government to protect its inhabitants and all people. The government system in the Netherlands is characterized as a decentralized unitary state that is governed through three different layers: a central government, twelve provinces and 344 municipalities, visualised in figure 2. These three layers all have their own role when it comes to flood risk management and climate change. Obviously, the central government is responsible for setting national laws and regulations. Provinces are responsible for regional tasks and municipalities have the authority when it comes to the adoption of zoning plans (Rijkswaterstaat, 2006; Wiering, 2019). However, the origin of the Dutch water governance is in the water boards. Citizens had to defend the land from fluvial and coastal flooding which created the need for a central institution that could keep the water away and drain the land. Nowadays water boards still fulfil a major task in Dutch flood risk management. They are decentralized public authorities with legal tasks and a self-supporting financial system. These organizations are responsible for flood control, water quantity, water quality and treatment of urban wastewater. Operational tasks include the management of pumping stations, wastewater treatment plants, maintenance of waterways and flood defence structures. Water boards are embedded in the general democratic structures (Rijkswaterstaat, 2006. P.55). There is another institute that has to be mentioned, Rijkswaterstaat which was founded in 1798 and is responsible for traffic and transport arteries and other infrastructural works. Rijkswaterstaat is the executive organisation of the Ministry of Infrastructure and Water Management. Their main tasks are the provision of sufficient and safe drinking water and safety against flood risks, both today and in the future (Rijkswaterstaat, 2006).

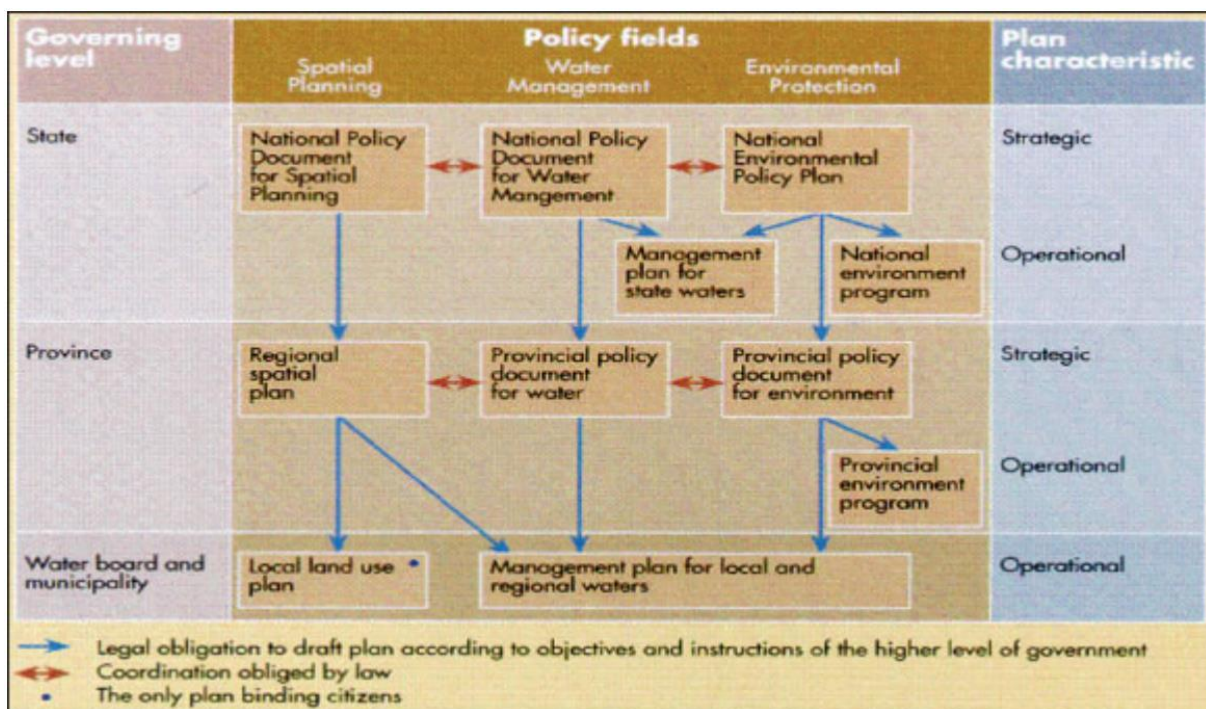


Figure 2 The set-up of policy fields in the Netherlands (Rijkswaterstaat, 2006)

Climate Change

The Netherlands are facing various threats and hazards due to climate change. External influences and our own interventions have led to different issues: peat soils become sandy or can sink meters, wet areas become humid, humid becomes dry, fresh becomes brackish or salty. And the lower parts of the Netherlands as a whole are becoming more vulnerable. This can be explained by a combination of: sea level rise, land subsidence and higher peak discharges by the river system (Deltares, 2021). A consequence of this is that what used to be a profitable economic land use in a particular place is now, or in the near future, no longer profitable. It is evident that in the Randstad, in the future as well as at the moment, there are already many constraints when it comes to urban development such as large-scale housing and work locations as visualised in figure 3. It is therefore important that climate change policy be anticipatory. In ensuring a safe, liveable, prosperous and sustainable future, the Netherlands must intelligently anticipate to nature and water in spatial planning. It is important that land functions become better coordinated with the hydrological and physical system, now and in the future (Deltares b, 2021; Wur, 2020). This is necessary to prevent a certain negative path dependency in the future. Preventing future negative effects or passing them on to future generations as a result of incorrect choices made at this moment in time must be the main focus. A combination of path dependency and incorrect choices can create a lock-in or lock-out, meaning that there are no alternatives to the current situation created by past choices. This implies avoiding lock-ins as well as avoiding the impossibility of a different course, lock-outs (Deltares, 2021, P11).



Figure 3 suitable geology for urban development (Deltares b, 2021)

The advantage today is that through technological innovation, urban environments can be built and operated in such way that they are less vulnerable to natural or man-made hazards and better for nature and the environment. In the long term, developing in such way is even assumed to save resources and costs (Swart et al., 2014; van der Heijden, 2014). The technology and social know-how is indeed available to facilitate a cost-effective transition towards cities that are less dependent on energy, water and other resources, produce fewer greenhouse gases and other wastes and can better withstand natural or human-made hazards (van der Heijden, 2014, P.14). When looking at individual dwellings and how more adaptation and mitigation can be achieved, there appears to be potential in almost all cases. Adding all these buildings together, a significant transformation can be achieved. Technology and behavioural change can both play a major role in creating sustainability and resilience. However, climate change and a growing world population have meant that this transition has not yet had the desired effect. According to van der Heijden (2014), governance must be able to provide the solution here.

2.2 Risk

Increasing climate risks and how to deal with them is one of the main focusses for this thesis. The definition of and the way risk is described varies among different scholars. The IPCC, the United Nations' leading intergovernmental panel on climate change, wrote a devastating report on the current state of the climate and future climate change risks. Risk is described by the IPCC (2022, P.4) as follows; Risk is defined as the potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. Beck (1992) defines risk as a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself. Specifically focussing on flood risk, the traditional definition consist of two compartments; probability and consequences, which together declare the increase or decrease in flood risk (Hohenemser et al., 1985; Bodemer & Gaissmaier, 2015; Kaufmann, 2022). With this definition risks can be measured since the probability and economic consequences of risky situations can be known or estimated on forehand. For example, one can estimate the risk of losing a game of poker in a casino, or the risk of a car accident in a given place. Although risky situations should not be confused with uncertain situations. For uncertain situations, the outcomes and the probabilities are not known. At least the probabilities have to be unknown to qualify as an uncertain situation (Bodemer & Gaissmaier, 2015).

Risk perception

Risk perception refers to the “subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences” (Sjöberg, Moen, & Rundmo, 2004, p.8). Pidgeon, Hood, Jones, Turner, and Gibson (1992, P.89) defined risk perception as “people's beliefs, attitudes, judgments and feelings, as well as the wider social or cultural values and dispositions that people adopt, towards hazards and their benefits”. Raaijmakers et al. (2008) defines perception through the interlinkages of three elements: awareness, worry and preparedness. Hypothetically the awareness of the probability of a flood event should increase the worry of a flood event and subsequently increase the flood preparedness. Overtime a better preparedness decreases worries and awareness of the probability of flood events. There is, however, no effect that can be distinguished between awareness or worry on flood preparedness as shown in figure 4. The experience of previous flood events does have a significant positive effect on all three elements and especially preparedness (Bradford et al., 2012).

The OECD (2014) has pointed to the so-called Dutch (public) awareness gap: although there is a strong governmental system in place, the people are no longer aware of their greatest societal risks: flooding. This can be explained by the strong governmental emphasizes on infrastructural works like dams and dykes in order to decrease the chance of flooding. Citizens who rely on these public structural flood protection reduces their worries and awareness of possible flood events and therewith their preparedness. Public information campaigns such as the Dutch 2006 “Denk vooruit” (Think forward) campaign are often found to have little impact despite many people receiving the information. The risk perception of the public is often different than expected in these campaigns. Successful flood risk management policies should embrace the understanding of how the social construct of risk is perceived by the public (Bradford et al., 2012).

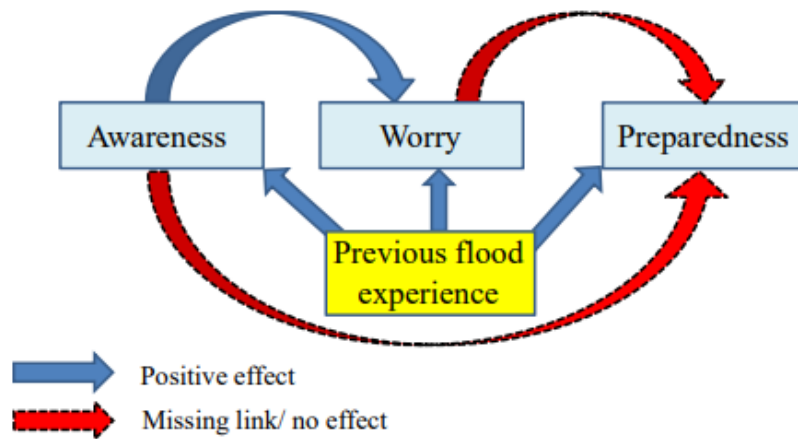


Fig. 4. Relationship between elements of risk perception in current study

Figure 4. Relationship between elements of risk perception (Bradford et al., 2012)

Risk Society Theory

When it comes to risk and the deeper meaning of risks, Ulrich Beck (1992) offers an interesting perspective for this thesis. In short, this theory describes a new global society in which the control and management of risks is central, instead of creating evermore prosperity. The difference with previous societies lies in the extent to which these risks are expected to be controlled. In addition, the effects of risks are often impossible to manage because today's society has created new unknown risks. This theory is particularly relevant to this research since the demand for flood risk management and climate adaptation stems from the desire to control undesirable effects of risks that are supposed to be caused by climate change. Not many policy makers are thinking about managing risk as a feature of modernity or see their role as holding back the tide of environmental ills brought forth by economic prosperity. Policy makers are mostly involved with the consequences of flood events, the risk society theory provides a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself (Beck, 1992).

Beck argues that there has been a shift in the nature of modernity, from the 'first modernity' – where social life and conflict is dominated by the production and distribution of goods resulting from rational control over social-material life – to a process of 'reflexive modernization' that results from self-confrontation with the latent side-effects of social action, which manifest themselves as risks (Beck 1999: 8, 73). By this shift the need of a new sociological imagination which is sensitive to the concrete paradoxes and challenges of reflexive modernity emerged. Beck and Giddens – who are the key authors of the risk society – offered an alternative sociological imagination for investigating the dynamics of contemporary society. Applying the redundant concepts of primary, industrial modernity to the fundamentally different problems of the second, scientific modernity is not only ineffective, it is a denial of our responsibility to invest in developing new solutions for new problems, to design new social institutions to monitor the social impact of emerging technologies and to establish new regulatory systems to manage the risks associated with new technologies. In essence, to effectively manage the technological risks emerging in the second, reflexive age of modernity, 'the script of modernity has to be rewritten, redefined, reinvented' (Beck, 1998, P.9).

Beck's risk society is based on the solution of the following problem; How can the risks and hazards systematically produced as part of modernization be prevented, minimized and distributed away so that they neither hamper the modernization process nor exceed the limits of that which is tolerable

inter alia ecologically and socially (Beck, 1992, P.19). Whereas previously it was assumed that external threats might be combated technologically, for Beck science is 'one of the causes' of contemporary risks. As such he suggests that we no longer have the assurance of salvation that science and technology once offered. Rather 'science becomes more and more necessary, but at the same time less and less sufficient for the socially binding definition of truth' (1992,P. 156). Beck therefore suggests that our relationship to science has become less-trusting, as it is increasingly recognised that scientific advance is at the centre of contemporary ecological and technological risks. While remaining dependent on technological innovation Beck suggests that a new form of 'reflexive modernisation' has emerged from the risk society. He states that: In the definitions of risks the sciences' monopoly on rationality is broken. There are always competing and conflicting claims, interests and viewpoints of the various agents of modernity and affected groups, which are forced together in defining risks (Kearnes, 2008, P.3).

Ultimately, both Beck and Giddens conclude that the ethos of wealth creation that characterized industrial modernity has been overshadowed by an ethos of risk avoidance, class consciousness has been displaced by a risk consciousness and the increased awareness of living in an environment of risk, uncertainty and insecurity have become a major catalyst for social transform (Ekberg, 2007, P.344). Beck (1992) argues that we are currently in between both phases, we do not yet live in a risk society but we also no longer live only within the distribution of conflicts of scarcity societies. In current welfare states a double process is taking place now; the struggle for 'daily bread' has lost its importance in current society. Parallel to that society is becoming more and more aware of the hazardous side effects which are produced by the ever growing wealth. When it comes to flood risk management, risk has always mattered. Floods were long seen as a natural danger that could be increasingly contained with technology. However, the increase of urbanisation along riverbanks and the occurrence of climate change have increasingly turned flood risk into a more manufactured risk, which is more related to the late modern society. Which is now resulting in a different approach of risk that is more in line with Beck's concerns.

Beck (1992) defines the new modernity by its main characteristic; the distribution of risks instead of the distribution of goods. Therein lies the primary importance of theory for this study. To explore how new urban development can contribute to more resilience for the region of Zwolle, it is not about distributing more wealth but about distributing and counteracting the probability of negative externalities due to climate change. Besides the fact that flood risk management mainly concerns the probability and consequences of flooding, it is increasingly about managing these risks. That is the second interest of the theory; it addresses the deeper meaning of risks and how to manage them. Beck (1992) offers an approach to dealing with these manufactured risks that typify late modernity. Together with the more practical application of the Starflood model as discussed later, Beck's risk society theory offers a new perspective on flood risks and how important actors can manage these.

Normal Accidents Theory

The normal accidents theory introduced by Perrow (1999) is in harmony with Beck's risk society theory. In some way the complex technological systems that are central in Perrow's theory can be assumed similar to Beck's risk society. The main assumption is that complexity itself is one of the main drivers of unpredictability and unforeseeable consequences (Hanseth, 2007). Perrow's basic argument about complexity is, more complex systems are likely to have higher accident rates because the potential interactions in such systems cannot be thoroughly planned, understood, anticipated, and guarded against — they go beyond engineers' ability to understand and manage intellectually (Leveson et al., 2009, P.230). He claimed that on rare occasions, some complex systems suffered an accident owing to

multiple failures, which interacted with each other in ways that could neither be anticipated nor comprehended. Perrow called such accidents normal accidents or system accidents (Shrivastava et al., 2009, P.1360). For these normal accidents to occur, three conditions are needed, according to Perrow (1999). Namely, the system must be complex, tightly coupled, and have catastrophic potential. This means that preventing these normal accidents can be achieved by reducing or eliminating one of these three conditions.

Perrow defines an accident as follows; any unintended and untoward event that disrupts the ongoing future of a system (Shrivastava et al., 2009). Perrow thus argues that in some cases accidents simply cannot be excluded because an organisation or body has become so complex. To explain these so called normal accidents, reference is made to two new concepts: 'interactive complexity' or 'complex interactions, meaning the number and degree of system interrelationships. These interactions occur in unfamiliar sequences, or unplanned and unexpected sequences, which are either not visible or not immediately comprehensible. The second concept is 'tight coupling', or the degree to which initial failures can concatenate rapidly to bring down other parts of the system. A system is tightly coupled when there is minimal time lag between the processes it executes; the sequence of processing does not vary; there is only one method available to accomplish a task, it can be done only in one way (Perrow, 1994; Pidgeon, 2011; Shrivastava et al., 2009). Pidgeon explains that universities for example maintain a high degree of interactive complexity, however they are not tightly coupled, which means that considerations and decisions are often effected by unanticipated factors but the results thereof are felt slowly. An example of a tightly coupled system that is less interactive complex is a modern production line with close and rapid transformations between one stage and the next.

Regarding the two dimensions of various systems the normal accidents theory states the following hypothesis, according to Shrivastava et al. (2009, P.1360): An odd failure in technological systems that are at once complexly interactive and tightly coupled can, under peculiar circumstances, lead to system accidents. When circumstances are just right, the failure can trigger other failures that can interact amongst each other in a manner that defies comprehension. To make matters worse, the complex interactions can cascade very rapidly in tightly coupled systems, which, by design, afford minimal slack and preclude the possibility of substituting either personnel or material. In effect, recovery from failure under such circumstances is almost impossible. The challenge then, from an organizational perspective, is to acquire the capacity to simultaneously cope with complex interactions and tight coupling.

The theory of normal accidents is relevant for this research for two reasons. The first is that this theory provides insights in the way complex systems are prone to accidents. In this research the accidents as described are mostly negative externalities as a result of climate risks. For the system of risk management in respect to climate adaptation and water safety applies that the system is tightly coupled but the interactions in the system are not as complex as in a nuclear plant for example. This makes the system slightly vulnerable for normal accidents. The potential of the accidents could be catastrophic, regarding the flood proneness of the region of Zwolle. That is the second value of this theory for this research, partly it is about better organization of the system and the awareness of its vulnerabilities, otherwise it can contribute in the improvement of this organisation. For the Zwolle region, this would involve mitigating the conditions for normal accidents: complexity, close coupling and catastrophic potential. When it comes to the question of how and where to build more residential areas, it is mainly about reducing the potential for disasters. A more resilient system in which flood risk management strategies are more diversified could lead to a reduced probability of normal accidents here.

Responsibility

The relation between risk and responsibility can be easily stated, at least on an abstract level. Risks only exist when there are decisions that have to be taken. The idea of responsibility also assumes that someone is obliged to make decisions. The notion of responsibility comes with the entrance of consequences of the decisions that have to be made. The transition from external to manufactured risk is bringing about a crisis of responsibility, because the connections between risk, responsibility and decisions alter. This is a crisis of responsibility with negative and positive features, corresponding to the negative and positive aspects of risk. Given the inherently ambiguous nature of most situations of manufactured risk, and the inherent reflexivity of these situations, responsibility can neither easily be attributed nor assumed (Giddens, 1999, P.8). Beck's concern is that our collective safety, security and survival are compromised because the anonymous and cumulative risks are characterized by organized irresponsibility, unaccountability and uninsurability. Organized irresponsibility explains how and why the institutions of modern society must unavoidably acknowledge the reality of catastrophe while simultaneously denying its existence, covering its origins and precluding compensation or control (Beck, 1998, P. 18). This organized irresponsibility, combined with the failure of the social institutions of the first modernity to govern effectively the unfamiliar and unlimited risks emerging in the second modernity, is exemplified and amplified by a failure of insurance companies to offer insurance as protection against risk, or to offer compensation to victims of risk events. As a consequence, the risk society is a post-insurance society, or as Beck proclaims: 'the residual risk society has become an uninsured society' (Giddens, 1999, P.53).

2.3 Resilience

Throughout history, countries have got used to the fact that there are crises and disasters that they have to deal with. As Beck (1992) points out, the nature of such crises and disasters seemed to follow familiar patterns, making their effects, however unpleasant, easy to assess. The advent of modernity has given way to crises and disasters whose effects are often neither predictable nor foreseeable. Besides the fact that human development has created new potential threats, threats that were previously easy to probe are increasingly wreaking unexpected havoc as their potential reach has expanded. National bureaucracies are finding it increasingly impossible to address both the causes and the effects of these potential disasters as they lurk beyond their reach and strike with overwhelming force. To make matters worse, nation states are increasingly vulnerable to these modern manifestations of old-fashioned threats. The vulnerability of countries is thus mainly caused by modernisation, technological development, improved infrastructure and globalisation. This has ensured that modern states have become tightly bound in a web of economic, political and social interlinkages. The paradox, however, lies in the fact that the same forces have enabled the system to cope with setbacks. The question, therefore, is whether the increased ability of modern societies is capable of providing robustness in the face of these various risks (Comfort et al., 2010). As an intellectual counterweight to the obsession with risk prevention during the cold war doom, Wildavsky (1988) introduced the concept of resilience.

Resilience is a concept that has gained a lot of popularity over the last decades. This makes that the concept is used in various ways which makes the concept ambivalent in a certain way. However, that does not mean that the concept is useless. The only condition is that the definition used is clearly defined. The idea of resilience is that our societies are considered to be social-ecological systems that should be reducing their vulnerability (to climate change, most often). When they do, they can be called resilient (Wiering et al., 2019 P.5). Reducing their vulnerability can of course be interpreted in different ways. Comfort et al. (2010) distinguish between a wide and more strict definition of resilience. In these definitions the way of reducing vulnerability plays a key role. Firstly, they address a tension between a speedy recovery and timely adaptation to address the extreme poles of the

continuum. On the one hand there is the ability to prevent a disaster from happening while on the other hand the ability to recover from a disaster is more central. The strict definitions of resilience focusses on one of these abilities while a broader definition includes the whole spectrum. Secondly, a distinction is made between the degree of disturbance that a society must be able to withstand. For example, resilience is assumed in terms of being able to withstand rare but devastating events, while the more wider definition assumes all types of disturbance, including routine and predictable ones. The last dimension in which resilience is ambivalent is the state of return to be achieved. The question here is whether a system is resilient if it returns to the exact state before the shock event or is it sufficient if the system simply functions again. In addition, the question is to what extent a resilient system is assumed to adapt in response to the shock event. Because returning to the status quo is not necessary a normative good thing for everyone.

In an attempt to summarise the literature Wiering et al. (2019 P.5&6) conclude the following; resilience as a term is ambivalent, as it refers to both stability (keeping a system in its place) and change (being adaptable). Secondly it refers to both flexibility and robustness (as the capacity to bend and return, like the grain bending in the wind). The ambivalence here is that resilience cannot be both flexible and stiff. As stated before, it is required to formulate a bright definition before referring to the concept of resilience. The definition that will be used is the one formulated by Comfort et al. (2010) based on the middle ground along the various debates that over the concept. This results in the following definition:

Resilience is the capacity of a social system to proactively adapt to and recover from disturbances that are perceived within the system to fall outside the range of normal and expected disturbances (Comfort et al., 2010, P.9).

In a process of avoiding risks or minimizing the impact caused by shock events, it is obvious to generate as much resilience in developments on forehand. In practice this is often goes hand in hand with additional costs. Swart et al. (2014, P.68), however, dispute this: “Even if measures to climate-proof an area would increase costs now, they would prevent damage in the future. Taking climate change into account, such as sea level rise and higher precipitation levels, will prevent large-scale flooding resulting high costs for restoration in the future”. Besides the prevention of additional future costs an early inclusion of climate adaptation and flood prevention also provides co-benefits in most cases. Examples of these co-benefits for the Netherlands are recreation and water storage, increased water storage capacity for periods with high or low water availability. Water reservoirs with the improvement and expansion of the recreational can provide higher spatial quality, this is an important driver of the ambition to realise flood risk management in conjunction with spatial policy objectives (Swart et al., 2014; Busscher et al., 2018). In addition to integrating climate adaptation and water governance into spatial planning in advance, there are several other strategies that promote a higher degree of resilience. Most scholars emphasise the need for diversification of these strategies and adaptability to reach a state of resilience. There are several frameworks that distinguish these different strategies. The two most relevant will be discussed below (Stowa, 2014; Kaufman et al., 2016; Wiering, 2019).

Multi-level safety

In an attempt to create more resilience through the inclusion of various flood defence strategies, the concept of multi-level safety was introduced in 2008 and focusses on three distinct layers: prevention, protection and preparedness as visualised in figure 5. The introduction of the concept of multi-level safety makes the system of water management slightly more complex. As the responsibilities for the several layers of safety are divided among different levels of government. This requires a much higher level of co-ordination (Stowa, 2014).

- Disaster management. This involves realising better coordination between different emergency providers, communication and evacuation plans but also the development of emergency refuges.
- Sustainable spatial planning. This refers to spatial partitioning like secondary dikes or other structures. An effort is made to protect vital infrastructures in case of a flood risk event.
- Prevention, which includes the primary dike system. This system is underpinned on cost/benefit analysis based on the chance of flooding (Stowa, 2014).

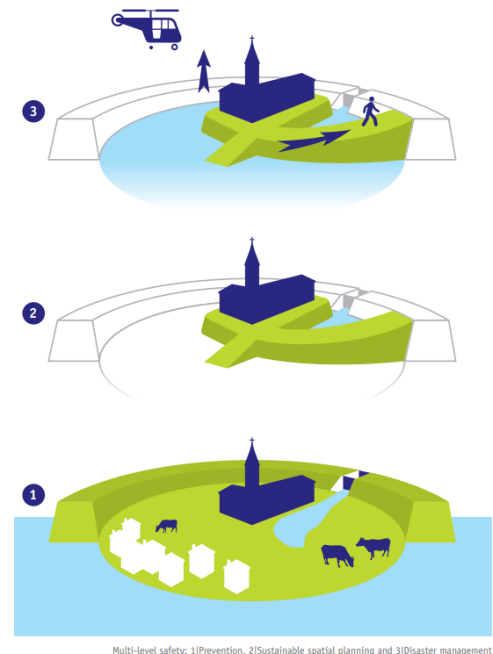


Figure 5 Multi-level safety (Stowa, 2014)

Star-flood: European program for flood risk management

Star-flood is a European program for flood risk management based on the European floods directive (Directive 2007/60/EC). In the European floods directive the '3Ps' were advocated: Prevention, Protection, and Preparedness (Bakker et al., 2016). These terms align with the three levels of safety in the previous model. However, the strategies referred to in the star-flood project are extended with an additional dimension; measures regarding the recovery phase of flooding. Besides that, the safety level of prevention has been divided into two different strategies; risk prevention and flood defence. Risk prevention is focussing on the preventive allocation and location politics which are aimed at the prevention of developments in flood prone areas. The distinction was justified on the basis that the measures employed within these strategies differ in terms of their treatment of water. Whereas defence measures act to resist and control water, risk prevention measures aim to accommodate water and work with natural processes. Measures employed in these different strategies have a shared aim, to minimize the likelihood and/or magnitude of the flood hazard (Bakker et al., 2016).

Regarding these different measures of flood risk management, the star-flood programmes' starting assumption is that a diversification of these different measures results in the highest level of resilience. A rigid focus on a single strategy is considered as less resilient. However, has to be noticed that the level of resilience is not only dependant on the amount of various strategies available. The extent to which these strategies are institutionalised and integrated into general flood management is important as well. This means that there should be a good balance between a variety of strategies. A robust hydro-technical infrastructural system is not sufficient without mature alternatives for that approach (Kaufmann et al., 2016; Wiering, 2019).



Figure 6 Flood risk management strategies (Kaufmann et al., 2016)

2.4 Policy arrangement theory

To shape the interview guide of this research, the policy arrangement theory will serve as a basis in combination with the research questions. A policy arrangement is described by Van Tatenhove and Leroy (2004, P159-160) as: “The temporary stabilization of both the substance and the organization of a policy domain. Temporary in what we regard to be an ongoing process of institutionalization, including its construction, de-, and reconstruction.” The theory is used to analyse the way in which a policy domain is shaped. In terms of organisation, substance and in a bounded time-space context. On the one hand, any shape of a policy domain is only temporary, as arrangements are under pressure of constant change, either by policy innovations on the ground or by processes of political modernisation. On the other hand, policy arrangements are characterised by specific spatial boundaries, although this does not imply that these cannot transcend traditional ones, such as the nation state. Therefore, policy arrangements may evolve at different levels of policy-making – local, national and transnational – or interconnect these levels, e.g. as specific forms of multi-level governance. The substantial and organisational characteristics of a policy arrangement can be analysed on the basis of four dimensions: policy coalitions, ‘rules of the game’, policy discourses, and resources (Arts & van Tatenhove, 2004, P.341).

The *rules of the game* are delineating a policy domain. Institutions are considered as sets of rules that guide or constrain people’s behaviour. These rules are not only formal constitutions and organisational structures. Informal guidelines or rules are included as well. In general, rules define the way the game should be played: which norms are legitimate, how issues may be raised; agendas set; interests articulated; policies formulated; decisions made; and measures implemented, e.g. by which procedures, by which allocation of tasks, and by which division of competencies between actors and organisations. In general, actors constantly draw upon rules that provide them with guidelines to act properly and legitimately (Arts & van Tatenhove, 2004 p.342)

Discourse is referring to way people interpretate and give meaning to policies. A policy discourse can be defined as: ‘A specific ensemble of ideas, concepts, and categorisations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities’ (Hajer, 1995: 44). Meaning is given to policies not only through formal policy concepts but popular storylines play a role as well (Arts & van Tatenhove, 2004).

The dimension of *resources* is inextricably linked to the concept of power. This dimension is fixed on the ability of actors to mobilize resources in order to effect a policy outcome. Here it is not only about financial resources but also about human or social capital (van Tatenhove & Leroy, 2004; Arts & van Tatenhove, 2004).

The dimension of *actors* refers to the relevant bodies involved in the policy arrangement. Not only individuals are referred to as actors but organizations or companies can be an actor as well. When actors share similar interpretations on the way how policies should be shaped and implemented, they can form a coalition. As a result, these united actors may share common policy goals and cooperate to achieve their collective goals.

Liefferink (2006) visualised the four dimensions of the policy arrangement theory in his tetrahedron, shown in figure 7. All dimensions are interconnected in the visualisation is captured that these dimensions are always affecting each other. The four-dimensional analysis of a policy arrangement also provides four different ways on analysing since each dimension offers a unique starting point and emphasis of an analysis. In practice, the analysis may in fact start at any corner of the tetrahedron, as long as all corners and the connections between them are eventually covered. This is not to say, however, that the choice of a starting point is unimportant. On the contrary, different starting points imply the use of different conceptual and methodological tools (Liefferink, 2006, P. 49). For this research the emphasis is on the system boundaries as it comes to flood risk management and climate adaptation. Based on the negative externalities that climate change are assumed to create, the idea is that we should prepare for this by creating more resilience in the region. A turnaround seems to be underway when it comes to the overall views on risk management of water and climate topics. Where previously the strategy was mainly focused on flood defence, and water had to be disposed of as soon as possible, this seems to have changed. The general discourse seems to have changed, partly due to reports such as the IPCC on climate change. Incorporating climate adaptation, environmental awareness and the risk of flooding appear to be gaining an increasingly prominent role.

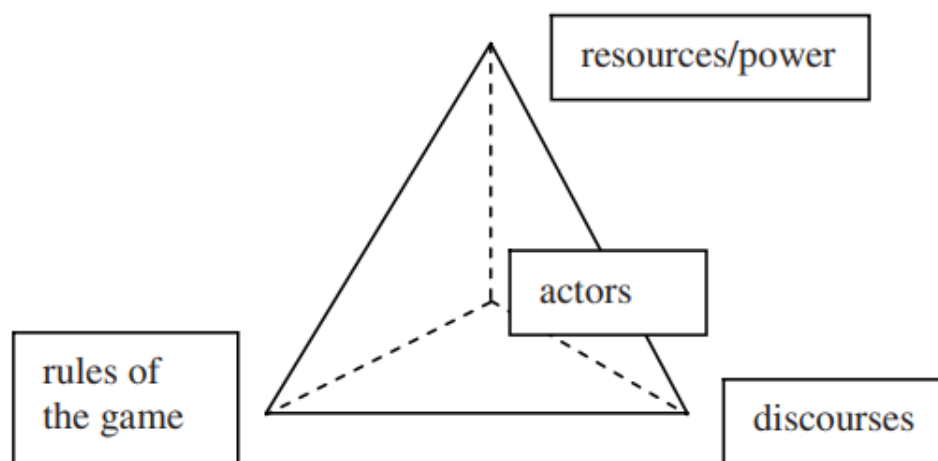


Figure 7. The tetrahedron (Liefferink, 2006)

The best way to start this analysis therefore is from the angle of discourse. From a theoretical point of view, entering the tetrahedron through the dimension of discourses may clearly be interesting to study the empirical effects of political modernisation, i.e. changing ideas about governance. In a more practical sense, the approach from the dimension of discourse also has to do with a change in problem definition, and therefore automatically also with possible solutions. From this starting point the other angles of the tetrahedron will be analysed as well (Arts and Van Tatenhove, 2004; Hajer, 1995; Liefferink, 2006).

2.5 Conceptual model.

The conceptual model that will be used throughout this study is based on the policy arrangement theory (Arts and Van Tatenhove, 2004; Hajer, 1995; Liefferink, 2006). The call for more urbanisation through the addition of residential real estate, is triggered by the housing shortage. However, the region is facing increasing climate risks as well. Both variables are assumed to destabilize the current policy arrangement (Ministry of internal affairs, 2022; Sweco, 2021-a; Deltares, 2021). The increasing demand for more urbanisation, mainly driven by the housing shortages in the region is one of the major drivers putting pressure on current policy arrangement. The pressure to build more houses not only causes the discourse to change but also the roles of actors to be distributed differently as well as their responsibilities. For instance, the state is attempting to take a more prominent role in solving the housing shortages (Ministry of internal affairs, 2022).

The climate risks have been known for some time, however, increasing awareness and knowledge is assumed to change the discourse around climate adaptation. In analysing the effect that these climate risks have, the theories on risk and responsibility become useful (Beck, 1992; Giddens, 1999; Raaijmakers et al., 2008). Climate adaptation is becoming increasingly important, this also means that different actors are expected to take on different roles. Both of these destabilising factors are expected to result in a new policy arrangement in which preparing for climate risks will become more and more central through diversification of flood risk management strategies as discussed by Kaufmann et al. (2016) and Bakker et al. (2016). The further urbanisation of the region can play a positive role in this. This urbanisation demand is in turn influenced by climate risks, mainly in the implementation and realisation of climate adaptation in new real estate. In the other direction, the addition of this new real estate can also have a positive or negative impact on the climate risks. If this real estate is realised with the hazards of the climate risks involved, the impact of these risks could decrease. Without the incorporation of these risks, the impact of these risks could only increase further.



Figure 8 Conceptual model

3. Methodology

In this chapter the research methods, philosophy and strategy of this research will be discussed.

Research methods

This research has a qualitative research method. The main reason for this is that in researching how to increase resilience for the Zwolle region by the realisation of new real estate, values, perceptions and interpretations of key actors are the most important source of information. Since quantitative research is based on adding knowledge and progress in their fields through the acceptance or rejection of literature based hypotheses verified by data, this would not suit this thesis. The description of qualitative research is less straight forward, there are multiple streams that belong to the family of qualitative methods. However, they all share an interpretive and naturalistic approach to the subject of research. Which is also the case for this research; the contribution of new urban real estate in the region of Zwolle towards more resilience connects well as a research question to qualitative methods (Vennix, 2011; Saunders et al., 2016). An attempt will be made to study the case of Zwolle and its important actors in their natural surroundings and interpret the findings in terms of meanings that people attribute to them. The main difference with quantitative research is that social reality is a reality constructed by actors and that the meaning of this as perceived by actors should be analysed or '*verstehen*'. Regarding the qualitative research, there is a constant alternation between theory, observation and analysis (Vennix, 2011). This constant alternation between theory, observation and analysis is necessary to actually provide insights in how to use the different flood risk management strategies and their indirect drivers to provide a higher degree of resilience. The emphasis on the construction of reality in both theories on the risk society (Beck, 1992) and various theories on risk perception (Sjöberg et al., 2004; Raaijmakers et al., 2008; Bradford et al., 2012) are strongly related to the values that are central in qualitative research. The theoretical framework that will be used during this research, also aligns best with a qualitative research. Furthermore, in line with the qualitative approach, this research will have an inductive and explorative nature. Based on the observations and interviews, an attempt will be made to make a general statement on how to increase the resilience in urban expansion in the region of Zwolle. Since these questions have not been answered before in this format, an explorative approach is evident (Vennix, 2011; Scheepers et al., 2016; Saunders et al., 2016).

Research paradigm

Different researchers have different philosophies on the art of doing research, referred to as a paradigm. Research paradigm is referred to as: "A set of basic beliefs (or metaphysics) that deals with ultimate's or first principles. (Guba & Lincoln, 1994, P.107). There are four main paradigms to distinguish in doing qualitative research as stated by Guba and Lincoln (1994): positivism, post-positivism, critical theory, and constructivism. In the search for how new real estate can contribute to greater resilience, interpretations and perceptions of actors play a major role alongside factual sources of information. This part of science, according to Guba and Lincoln (1994), best aligns with a constructivist research paradigm. In addition, the constructivist approach is also in line with the qualitative method already adopted.

Considering Beck's (1992) Risk theory, the paradigm of constructivism is most suitable for this research. Beck's theory emphasises that our reality is based on social constructs. This research focusses on the role of different flood risk strategies in the light of the constructed reality that is described by the risk theory. Guba and Lincoln (1994, P.111) referred to constructivism as the following; "constructivism's relativism, which assumes multiple, and sometimes conflicting social realities that are the products of human intellects, but that may change as their constructors become more informed and

sophisticated". In the context of ever-increasing pressures on space, these social realities play an increasingly important role. Risks and challenges are increasing: climate risks, the housing shortage, and other urban challenges. Conflicting societal realities can result in different interests regarding the limited space available. Understanding and analysing these realities is an important part of this research as different actors with different interests defend conflicting interests precisely because of these kinds of socially constructed differences. For the Zwolle region, understanding these differences in reality could ensure fewer conflicting interests, allowing problems such as climate adaptation and the housing shortage to be addressed more quickly.

Research strategy

Verschuren and Doorewaard (2007) distinguish five main strategies that are prevalent in scientific research: survey, experiment, case study, grounded theory, and desk research. A survey is the perfect strategy to generate a broad view on the subject of research, mostly to generalize the outcomes over a broader set of cases. Conducting a survey is strongly associated with quantitative research. For that reason conducting a survey is not suitable since decided that the aim and questions of this research demand a qualitative method. An experiment is the only strategy that can give a definitive answer on the causal effect of one factor on the other. To achieve this, a baseline measurement and a controlled group is required, additionally the inquire needs to limit all external effects as much as possible. For this research, conducting an experiment is not feasible due to the practical implementations. Based on the research aim and questions it is not evident to choose a grounded theory approach. A case study can be defined as research where the inquirer attempts to obtain an in-depth integral overview of a single object or process. A case study strategy has the capacity to generate insights from intensive and in-depth research into the topic or research in its real-life context, resulting in rich, empirical descriptions. Considering the main research question, this strategy is most suitable for this research. The case study will be combined with a desk research, the data that is already provided on forehand will be analysed as well.

For the case study as a strategy applies that there are different forms that can be implemented. These different forms are based on the number of cases that will be inquired during the research. Besides the number of cases that plays a role, the mutual similarities between cases can play a role. So can a researcher decide to compare cases that have various differences but are similar on one selected aspect, to approve the generalizability the differences should not be to various. Or on the other hand one could choose to compare cases that have one aspect in common but differ on various other aspects. This is mainly interesting for extrapolating causality (Yin, 2003; Verschuren & Doorewaard, 2007). For this research the interests are mainly in de case of the region of Zwolle. For this reason, it is most valuable to choose for a single case study where the region of Zwolle is central. In essence, this means that the generalizability of the research will be rather limited.

Data Collection

Most of the data that will be collected during this research will be collected through observations and conduction expert interviews. Regarding the observations, in this research, conducting participatory observations will be used. This means that the researcher directly participates in various activities to be observed. Through intensive and varied contacts, insight will be gained into the processes of policy and decision-making. Participatory observation consists of various methods of data collection. Which means that the researcher not only makes observations, but also walk along with people and participate in their activities (Scheepers et al., 2016). The disadvantage of these participatory

observations is that the inquirer can be biased himself by the surrounding in which the observations are done. On the other hand the presence of the inquirer in the field might possibly affect the statements and behaviour of the individuals and processes to be observed. This does not necessarily have to cause a problem as long as the researcher is aware that this bias can occur.

Regarding the observations, there were several moments where information was gathered. Weekly meetings where various experts in the field of water management and climate adaptation from the entire region were present formed the basis for the observations. Here, input was generated for policy documents, as well as information on new developments in the sector. Besides these weekly meetings, several interdisciplinary meetings were attended where different policymakers discussed and critiqued the basis for the urbanisation strategy. In addition, several meetings were attended on a variety of topics that are not specifically relevant to the content of this study, however, these meetings provided a good context of the state of affairs within the region.

Since this research only includes one case, it is desirable to use a combination of different methods of data collection. This is referred to as triangulation (Verschuren & Doorewaard, 2007). Besides the extra data delivered through triangulation, it is also in favour of the validity and reliability as discussed further on in this section. For this research applies that besides the observations and desk research, data will be generated through the conduction of expert interviews as well. In line with the explorative nature of this research, the interviews will be semi-structured and face-to-face. Which means that there will be an interview guide used by the inquirer during the interviews to ensure that the desired data will be collected. Semi-structured interviews enable the interviewees to deliver the input that they value as important for the research. Since all interviewees are experts, it is important to allow this opportunity for own input and specification of certain answers in order to get an in-depth view of the overall situation. In order to get a sophisticated overview of the different perspectives on the central subject in this research, it is important to collect all relevant data from the different stakeholders. In order to achieve this, interviews will be conducted with the representatives of the following actors:

	<i>Actor</i>	<i>Description</i>
1	<i>National government</i>	<i>Policy advisor housing and spatial planning at the ministry of spatial planning.</i>
2	<i>National government</i>	<i>Senior advisor climate adaptation at the ministry of infrastructure and water</i>
3	<i>Province</i>	<i>Strategic advisor spatial planning at the Province of Overijssel</i>
4	<i>Province</i>	<i>Policy advisor housing and urban areas at Province Overijssel</i>
5	<i>Province</i>	<i>Program manager climate adaptation</i>
6	<i>Municipality of Zwolle</i>	<i>Advisor water and climate at the municipality of Zwolle.</i>
7	<i>Municipality of Zwolle</i>	<i>Planning officer at the municipality of Zwolle.</i>
8	<i>Municipality of Zwolle/Region</i>	<i>Process Manager Urbanisation Strategy</i>
9	<i>Region</i>	<i>Programme Manager Environment/ Planning officer</i>
10	<i>Water board</i>	<i>Strategic policy advisor water board</i>
11	<i>Developer</i>	<i>Project developer in the region Zwolle</i>

Data analysis

The data that will be collected through the expert interviews and desk research must be analysed as well. The interviews will be recorded where possible and transcribed afterwards. These transcripts enable the researcher to analyse and code the interviews with the Atlas TI programme. The codes will be based on the conceptual model as shown in figure 8. together with the insights gained during the interviews. This is an iterative process where theory and data together will form the desired output (Vennix, 2011). For the observations the same applies. The notes that will be gathered during the conduction of the observations will be further elaborated and analysed.

Validity and reliability of the research

Generally, conducting sufficient research involves collecting and analysing data. The quality of a research is therefore largely determined by the quality of the collected data and analyses. In order to determine the extent to which this quality is guaranteed, two questions can be asked which respectively have to do with the reliability and the validity. Firstly, one can ask whether the observations made are not random observations; this concerns the reliability. Secondly, one must ask whether an observation covers reality, this deals with validity (Scheepers et al., 2016). Reliability is important for the repeatability of a research. Since reliability is mostly affected by unsystematic mistakes, the repeatability of a study may be compromised if too many random errors are made. This decreases the quality and credibility of research in general (Saunders et al., 2016). For this research, reliability will be preserved because the interviews will be recorded and transcribed. This will enable other researchers to reproduce this research as much as possible. Besides that, the use of different methods of data collection will make sure that random errors will be noticed sooner by the researcher, therefore reliability will increase as well (Vennix, 2011; Scheepers et al., 2016).

Validity is twofold, internal and external validity. The internal validity is about the exclusion of systematic mistakes. In qualitative research this can for example include an incorrect questioning in an interview guide which leads to a systematic distortion of results and conclusions. To increase the internal validity in this research the inquirer will be present during the interviews, in this way misinterpretations of questions can be prevented. Besides that, all interviewees will receive a summary of the interview guide on forehand so they can prepare their answers. This will ensure that the desired data will actually be received. External validity concerns the extent to which the results of this research can be generalised to other cases. As described earlier, this research is based on a single case study, which means that the results obtained in this research are in principle only applicable to the situation studied. This means that the external validity of this research is very limited. However, this does not mean that the results of this research are totally irrelevant for other cases but simply taking over the conclusions from this study one by one is not possible (Vennix, 2010; Saunders et al., 2016).

4. Case description

Various critics are asking where we should facilitate urban expansion in the Netherlands (Sweco, 2021-a; Kaufmann et al., 2015). On the one hand, the question is raised whether it is a good idea to locate most of the housing needed to overcome the housing shortage in the Randstad. With an eye to the future and the expected consequences of climate change, it seems increasingly difficult to guarantee the water safety of the Randstad (Sweco, 2021-a). Critics are often pointing eastwards as this is where the higher sandy soils are located that are considered less vulnerable to flooding and rising sea levels in the long term. However, in the development of new residential real estate the game of supply and demand remains relevant. People like to live in an attractive, often urban environment. From that perspective, Zwolle is often put forward as an interesting location, easily accessible, (semi-) urban, and attractive to live in in the east of the Netherlands. However, Zwolle, like most large cities in the Netherlands, is already struggling with a shortage of housing for the current demand, let alone for possible additional growth. Zwolle, despite its eastern location, also has to contend with the negative effects of climate change and flooding. This area, the delta of the IJssel and Vecht rivers, is sometimes called 'Holland in miniature'. There is a substantial housing challenge in a dynamic delta. All the climate challenges that are facing the Netherlands on a national scale are faced by Zwolle on a regional scale (Province Overijssel, 2022, P.12). This makes this region a very interesting case study with an eye to the future, especially because of the multitude of opportunities and challenges that will have to be dealt with.

Region of Zwolle

The Zwolle region is situated in the eastern part of the Netherlands, it covers parts of four different provinces. Namely; Overijssel, Flevoland, Drenthe and Gelderland. However, the centre of gravity of the region is located in the capital of the province of Overijssel, namely the city of Zwolle. It is also the name of the NOVI/NOVEX-region, which are areas that are being redeveloped as a result of national policies (ministry of VRO, 2022). Bottlenecks have arisen in the region due to growing pressure from people and businesses looking for a place to live and work. This is due to national issues, such as the widely felt pressure on the housing market (in the region approximately 40,000 houses until 2040), but also to regional issues, such as the spatial structure in which there is a strong interaction between larger and smaller cores, which is often filled with car mobility (Province Overijssel, 2022, P4).

Given the subject matter of this study, the two main problems facing the Zwolle region are, accommodating sufficient new capacity on the housing market and preparing for increasing climate risks. The main demographic changes are the continuing population growth, the increasing ageing population and the growing diversity. A large part of the growth in the number of households consists of people living alone and this is mainly due to the ageing population - about 50% of the housing challenge is caused by household thinning. To respond to this development, many affordable homes are needed for single or two-person households (Province of Overijssel, 2022, P10). At the moment, the construction of new homes is mainly aimed at brownfield locations. However, this is not sufficient to meet current demand. Therefore, greenfield locations will also be developed in various parts of the region. There is a variety of soft planning capacity that needs to be taken into consideration when it comes to permits et cetera. In the case of urban expansion, it is already stressed in many cases that the soil and subsoil must have a leading role in the design process. Precisely because in many cases this subsoil can lead to various problems in the long term.

Geology of the underground

As mentioned before, the various types of subsoil in the region present a variety of challenges when it comes to guaranteeing both flood protection and preventing future lock-ins. It is for this reason that Sweco (2022, P.3) has drawn up a set of starting points at system level. The most important starting points that are relevant from the subsoil perspective are the following:

- *Urbanisation follows the water system with natural & multiple solutions. Thinking from the logic of the system and by combining tasks on the spot.*
- *Hold on to a drop: as long as possible, as high as possible, and use it in as many ways as possible, before discharge to the sea or evaporation.*
- *The sponginess of an area development always increases.*

The basis for the problem is that in a number of areas, uses, including agricultural activities, are not or insufficiently balanced with soil and hydrological conditions. This applies, for example, to the peat meadow areas. Drainage - often for agricultural use - leads to peat oxidation in these areas and with it increasing CO₂ emissions. The associated subsidence of the peat package leads to subsidence. The need for a safe water system (that can also cope with peak showers) - because of rising sea levels and higher water discharge in the rivers - leads to new space claims, where choices have to be made now to preserve sufficient space for the long term. This also puts pressure on the ecological, scenic and recreational quality of rivers, large waters and the coast (Ministry of internal affairs, 2022, P.8). Figure 9 shows the different types of subsoil at area level. For all the different types of subsoil, the above principles must be leading in any new planned area development.

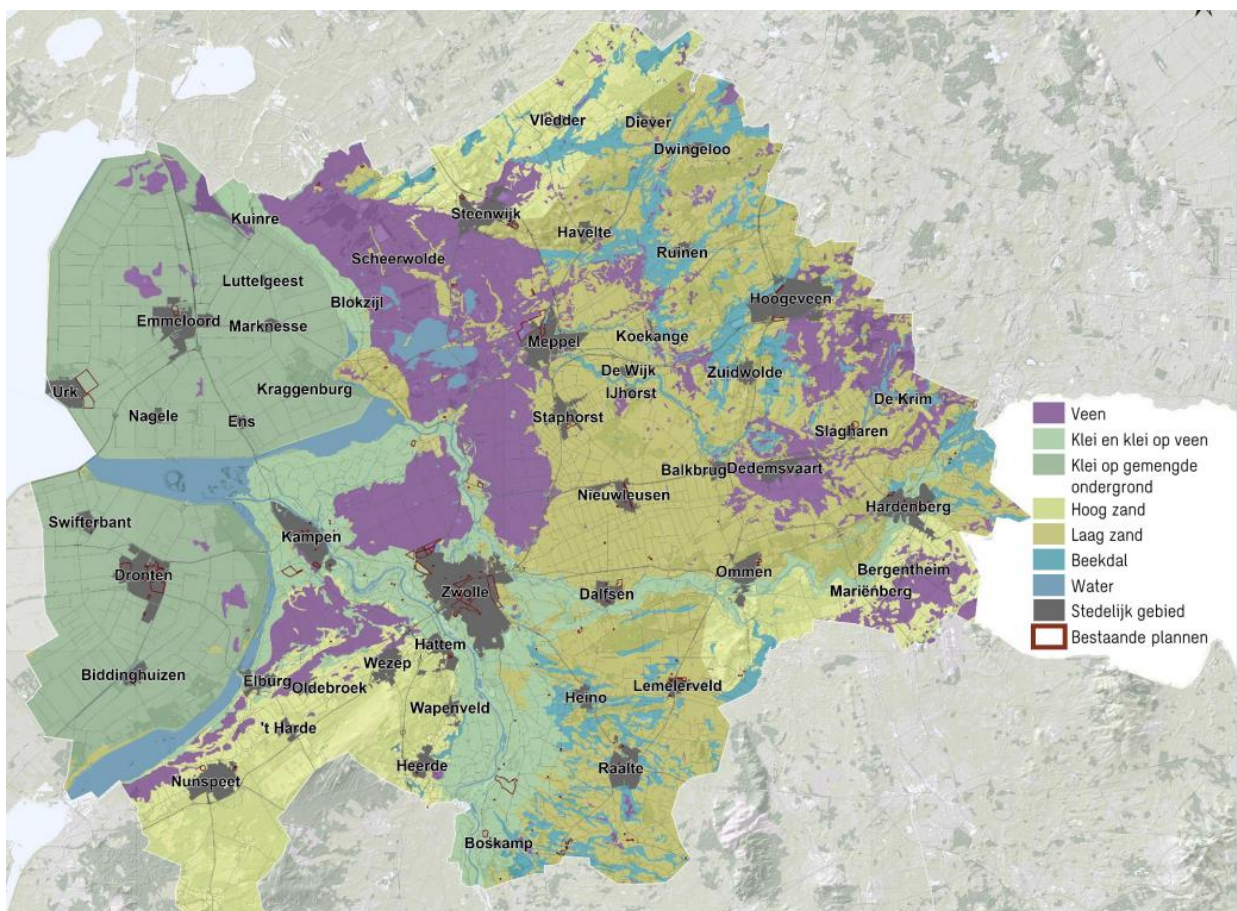


Figure 9 Geology (Sweco, 2022)

Peatlands

Peatlands are naturally wet areas. The areas are drained to prevent flooding. However, this leads to subsidence through peat oxidation, which releases greenhouse gases. This process is reinforced by the fact that low groundwater levels as a result of drought are becoming more common. In the Climate Agreement it was agreed to limit the emission of greenhouse gases by 1 M ton. An average groundwater level of 20 cm-mv is optimal for this. Therefore, a future stepwise rewetting will have to be taken into account (Sweco, 2022, P.6).

Clay, clay on peatlands, clay on mixed soil

In order not to reinforce soil subsidence, the water levels in the clay and clay-on-peat areas may no longer be lowered in the future. Soil subsidence will cause the area to become more humid. In addition, it is desirable to apply flexible water level management in these areas, which will retain more clean rainwater or seepage water and make these areas more drought-resistant. On clay soils, flexible water level management in spatial developments has to be regarded. In addition, higher groundwater level have to be realised (smaller drainage) as a result of subsidence. The lowest parts of the polders have the smallest drainage. These are also the places where water will flow in case of extreme precipitation, causing water to stand on ground level (Sweco, 2022, P.6).

High sand

The high sandy soils often have a lower groundwater level and a good permeability of the soil. Here is room to infiltrate water and retain it in the soil. Retaining water in wet periods as a buffer for dry periods ensures that the average groundwater level rises. On high, sandy soils, spatial developments should allow for an average 20 cm rise in the average highest groundwater level (Sweco, 2022, P.5).

Low sand

The low sandy areas are former peat moors that have been excavated. These areas are now being drained, but offer opportunities to retain more water. By retaining and storing more water, downstream areas are relieved in wet periods and the groundwater buffer is larger in dry periods. This does lead to a rise in groundwater levels. On low sandy soils (former peat moors), take account of the average highest groundwater level up to ground level in spatial developments (Sweco, 2022, P.5).

Stream valleys

The stream valleys were formed under wet conditions and are naturally wet areas. In many places, restoration of the stream is necessary to improve the water quality and biodiversity in order to comply with the water framework directive. In addition, an increase in extreme precipitation and drought means that extra space is needed to retain and store water. In stream valleys, climate change will lead to greater variation in runoff. Additional storage space is needed to cope with greater discharges. A new balance between draining and retaining water is also needed. Retaining more water in wet periods as a buffer for dry periods will lead to higher average groundwater levels in the lower-lying stream valleys. Protect a zone of at least 100 metres on both sides of the stream from permanent construction in order to retain space for future drainage and additional water storage areas. On so-called stream valley grounds further from the stream, take account in spatial developments of average highest groundwater levels up to ground level (Sweco, 2022, P.5).

Urban area.

Current urban areas often do not meet the standards we impose on new urban developments. This results in a challenge for the current urban area. In existing urban areas groundwater levels are often artificially controlled by water courses and drainage. New developments can contribute to solving bottlenecks in the current urban areas. In the urban area, we preserve and reinforce the natural functioning of the regional groundwater system. Urban renewal and brownfield development have to be in line with the natural underground and restoration of the original water system. The aim is to increase the sponginess and connectivity of a robust green and blue network, to which existing built-up areas can connect (Sweco, 2022, P.6).

Type of underground	Peat	Water	Stream valleys	Clay, clay on peatlands	Clay on mixed grounds	High sand	Low sand	Total number of planned houses
Municipality								
Dalfsen	-	-	2	16	-	-	1.843	1.861
Dronten	-	-	-	-	2.084	-	-	2.084
Elburg	-	-	-	250	-	-	-	250
Hardenberg	160	-	608	-	-	96	481	1.345
Hattem	-	-	-	-	-	510	-	510
Heerde	-	-	-	-	-	100	-	100
Hoogeveen	35	-	1	-	-	-	465	500
Kampen	200	10	-	2.451	-	-	15	2.676
Meppel	971	163	126	-	-	-	1.170	2.430
Noord-Oostpolder	-	-	-	-	200	-	-	200
Nunspeet	-	-	-	-	-	-	750	750
Oldebroek	-	-	-	-	-	116	-	116
Olst-Wijhe	-	-	32	709	-	-	104	845
Ommen	-	-	-	-	-	59	462	521
Raalte	68	-	60	10	-	-	419	557
Staphorst	-	-	-	-	-	-	427	427
Steenwijkerland	117	-	28	6	-	665	78	894
Urk	-	-	-	-	1.300	-	-	1.300
Zwartewaterland	23	0	-	258	-	-	286	567
Zwolle	1.172	272	-	1.597	-	66	9.535	12.642
Totaal	2.745	445	857	5.297	3.584	1.613	16.034	30.575

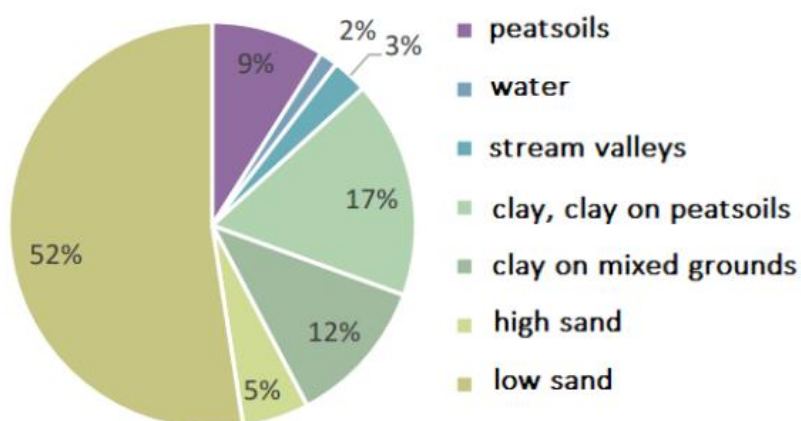


Figure 10 Geology infographic (Sweco, 2022)

Water system

For the Zwolle region, large parts are in vulnerable areas. This is due to the various rivers converging in the region as shown in figure 11. Therefore different principles have been set up to maintain the flexibility for the national water system and to avoid lock-ins. It is notable that most of the assumptions are the same as for the influence of the subsurface, however, this is easily explained by the interrelatedness of soil and water within the regional system (Sweco, 2022, P.14). Figure 12 shows which areas are at risk of flooding.



Figure 11 Water system (Sweco, 2022)

- Avoid urbanisation in places that require a lot of measures. Locations that do not connect to the natural water system and do not help existing buildings with their tasks.
- Urbanisation follows the water system with natural & multiple solutions. Based on the logic of the system and by combining tasks on site.
- Hold on to a drop: as long as possible, as high as possible, and use it in as many ways as possible, before discharge to the sea or evaporation.
- The sponginess of an area development always increases.

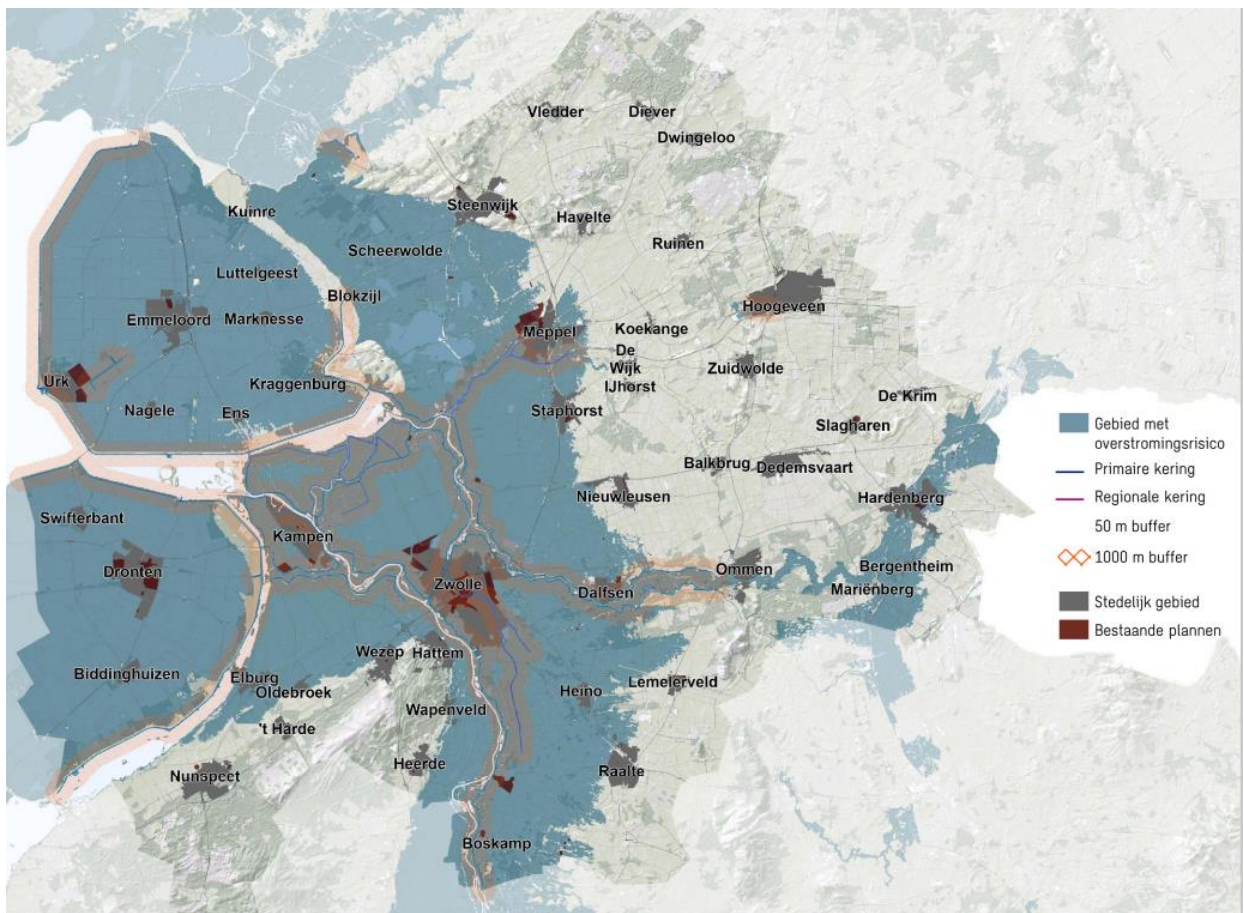


Figure 12. Flood proneness of the region (Sweco, 2022)

The point of view of the water system, there are also various area types to consider. This mainly concerns the retention of water on the one hand, and on the other hand not hindering any interventions that may be required in the future to guarantee water safety. For this reason, Sweco (2022, P.14) distinguishes between the following area types with their corresponding basic principles.

Around flood defences

Safe functioning of the river system and providing water safety are leading factors in spatial developments. Spatial developments have to take into account and do not constrain future river discharges and the possible need to raise the water level of the IJsselmeer. Also, developments must anticipate higher groundwater levels and water overflow of the defences. Space must be reserved for future dike reinforcements, this space needed for future dike reinforcements is determined by the outer water level and the preference for vertical solutions to piping. An increase in the outer water level by 2 metres results in a required space reservation of approximately 50 metres. On dikes and in a zone of 50 meter along primary and regional flood defences, construction leading to obstacles for future dike reinforcements has to be prevented. This zone should preferably be kept free of buildings. If buildings are nevertheless constructed, the ground level must be raised to 50 cm above the current height of the barrier, with sufficient space being reserved for reinforcement and/or raising of the barrier in the future (Sweco, 2022, P.14).

On a broader scale, measures will also have to be taken. In a zone of one kilometre from the crest of the dike the following must be taken into account: for spatial developments applies that the groundwater can go up to ground level as a result of transshipment water and an increase in seepage water due to a rise in the level of the IJsselmeer. This zone is also a signalling zone for spatial developments to prevent the river being constricted. Spatial developments with permanent construction on one side of the river may not be developed on the other side. This space may be needed in the future to give the river more room (Sweco, 2022, P.14).

Along watercourses and primary water courses of the regional system

Due to increased extreme precipitation, the drainage capacity of the main drainage routes may need to be increased in the future. Therefore spatial developments near the main regional waterways must take future widening into account (Sweco, 2022, P.14).

Building outside the dykes in the primary water system

In areas outside the dykes, the drainage function of the regional system is leading for spatial developments. This means that development in the flowing part of the regional water system is has to be prohibited. In the storage part, development can be permitted but only under strict conditions (Sweco, 2022, P.15).

Low lying areas

Low lying areas are natural locations for future flood storage. Therefore, spatial developments must take into account 1 m of water at ground level. Spatial developments must not affect the storage capacity of these locations and the loss of storage must be compensated (Sweco, 2022, P.15).

Urban area

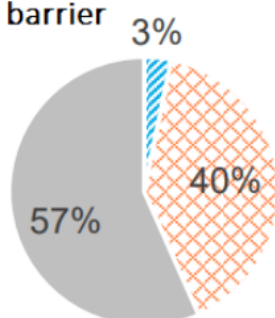
Current urban areas often do not yet meet the standards we impose on new urban developments. This results in a challenge for the current urban area. New developments can contribute to solving bottlenecks in current urban areas. New developments in urban areas must therefore always create more space for water: New tasks will not be solved piecemeal within the planning boundaries, but will

strengthen the existing urban green-blue network. This will increase robustness and flexibility (Sweco, 2022, P.15).

	Flood proneness		Water barriers		total number of planned houses
	floodprone area	area not prone to flooding	within 50 meters	within 1000 meters	
Dalfsen	680	1.181	-	574	1.861
Dronten	2.084	-	-	-	2.084
Elburg	250	-	-	-	250
Hardenberg	580	765	-	-	1.345
Hatterr	110	400	-	-	510
Heerde	-	100	-	-	100
Hoogeveen	-	500	-	194	500
Kampen	2.676	-	79	2.489	2.676
Meppel	1.700	730	-	137	2.430
NOP	200	-	-	-	200
Nunspeet	-	750	-	-	750
Oldebroek	-	116	-	-	116
Olst-Wijhe	845	-	3	441	845
Ommen	28	493	-	6	521
Raalte	423	134	-	15	557
Staphorst	427	-	-	-	427
Steenwijkerland	162	732	-	43	894
Urk	1.300	-	-	361	1.300
Zwartewaterland	567	-	68	347	567
Zwolle	12.642	-	830	7.570	12.642
Totaal	24.674	5.901	979	12.176	30.575

Number of houses near a water barrier

▨ Barrier + 50 m ▨ Barrier + 1.000 m
■ Not situated near a water barrier



Floodproneness of houses

■ Risk of flooding
■ No risk of flooding

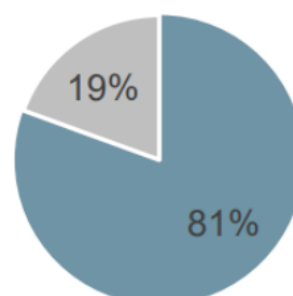


Figure 13 Flood proneness of houses (Sweco, 2022)

5. Results

In this section the collected and analysed data will be presented. The result chapter will be divided into four different sections that will answer one of the sub questions as stated in the introduction. Starting with the analysis of the environmental challenges and the urbanisation challenges, followed by the relation between these two factors. As these factors and their relation are discussed, their effect on the management and involved actors will follow. Ending with the analysis of the transition that is needed towards a new policy arrangement.

5.1 Environmental challenges

In the case description the region of Zwolle has been described as a good accessible semi urban attractive part of the Netherlands to live in. Like more Dutch cities, Zwolle is facing some serious climate risks. This delta of the IJssel and Vecht rivers, is sometimes called 'Holland in miniature'. All the environmental challenges facing the Netherlands on a national scale are faced by Zwolle on a regional scale (Province Overijssel, 2022). All respondents agreed on the challenging situation which the region is in regarding the climate issues. As explained by the advisor climate adaptation of the national government;

"Zwolle always refers to itself as the Netherlands in miniature and they are right about that. There are a lot of challenges but also a lot of opportunities. I think Zwolle as a city is doing a lot of great things, but the city is just vulnerable, or in a vulnerable place. If there are problems anywhere in this area to occur, it's Zwolle. Just as certain parts of the Randstad are the drain on the rest of the country, Zwolle is the drain on the IJssel. That's why all this attention, which is good I think."

The realisation that Zwolle as a city is in a vulnerable situation is widespread among respondents. However, it is not only flood proneness that plays a role in the IJssel Vecht delta so describes the spatial planning advisor of the province; *"I do think the Zwolle region is a very interesting constellation because it is so incredibly multifaceted, also from the perspective of climate tasks. We have a very large climate challenge. The canals are directly connected to the IJsselmeer where the delta of the IJssel and the Vecht come together via the Zwarte Water river, we really have a big task here."* The water that enters the Netherlands at the German border in Lobith will partially end in the IJsselmeer. Besides the expected higher river levels and peak discharges, the IJsselmeer itself is also expected to rise. Partly due to rising sea levels but also to serve as a freshwater supply. It is these freshwater supplies that are needed because, in addition to flood risks, larger water shortages are expected to arise from drier periods.

Despite the fact that Zwolle, as provincial capital, is the centre of gravity of the region bearing the same name, the region extends beyond the city alone. Consequently, the region faces partly different problems as its geology and subsoil differ from the city itself. This means that the environmental challenges cannot be described as unequivocal. This is how it is explained by the respondents on behalf of the water authorities and Overijssel province:

"At the same time, if you look at the Zwolle region as it is viewed administratively, there are some really strange areas in it. The Veluwe on the southern part really has a different water system and the Flevopolder in the west even more so, which is basically a big bathtub with a dike around it. If you let the landscape and water system in the Flevopolder be the guiding principle, I don't really know what you do there".

That there are major climate challenges ahead for the region may be clear. As the following phrase from the respondent on behalf of the water authorities shows : *"In the long run, it might be about other drainage distribution. I think a lot is going to happen, or yes a lot has to happen to keep it habitable here."* Regarding Beck's risk theory this was in line with the expectations. Risk of flooding is

gaining more and more attention in the region, due to more knowledge and awareness of increasing risks. With the expected transition towards a reflexive modernity, societies will be more concerned with future risks. In this case, the increasing awareness on flood risk as a result of urbanisation in flood prone areas.

Discourse Environmental issues

When it comes to the discourse around climate change and climate adaptation, there is one thing that stands out very clearly and that is that all respondents note that there is much more attention to it in the public discourse, as explained by the province's spatial planning policy adviser: *"It may be that this is perhaps reasoned from my own bubble. You see that there is unimaginably more attention to it. That politics has penetrated from left to right (and with the latter this is new) or at least has been put on the agenda."* The interest from the municipality of Zwolle is also striking: *"It's only about sustainability, actually there is only one topic. Climate is of course an obvious part of that."* That this is a stark contrast with a few years ago is obvious, the province's climate adaptation programme manager also says: *"Yes, four years ago there was still discussion about whether climate change was happening. Back then, there were really ministers who denied that the climate was really changing as badly as various experts were saying. We won that race."* This was in line with Beck's risk theory. With the entry of reflexive modernity, societies will be more concerned with future risks caused by, in this case, the negative external effects of climate change as a result of the industrialisation in the first modernity. That there is more focus on climate seems obvious. However, it is also noted that there may be less support for climate adaptation and awareness of climate risks in society as a whole compared to those professionally involved in this. As described by Beck (1992) in the period of transition, some parts of society are still struggling for their daily bread while the more prosperous parts are increasingly concerned with risks. The province's spatial planning policy adviser cites: *"But if you hear the major pollsters, there are still a lot of people who don't find it interesting at all. But these may be people who are already struggling to earn a living at all with current inflation. Then I understand that climate adaptation is not very high on your list of priorities."*

Among respondents, everyone is aware of the issues surrounding the changing climate and the associated negative externalities. However, different narratives can be distinguished. The climate adaptation advisor at the Ministry of Infrastructure and Water Management also noticed that:

"There are people who say you have to allow the water a lot more and we have to build only in highly situated places, that's one side of the spectrum. On the other side you have people who say; we need to use some smarter places in particular but we need to continue reinforcing our dykes and primary flood defences in particular. We can continue to live just fine everywhere in the west of the Netherlands in all the polders until 2300/ 2400. That is the other side of the spectrum. Probably the reality will be somewhere in the middle."

The first narrative is based on the finiteness in which technical solutions cannot cope with the future challenges in the field of water safety and climate, in line with the assumptions of Beck's risk society. The climate adaptation advisor of the Ministry of Infrastructure and Water Management is supporting the first narrative: *"The system that we as a government solve everything technically is finite. That is just not doable anymore and that is actually also an unfair situation for the very vulnerable areas. We are also running into the limits within our system. It has worked well for a long term but this will end one day. So it has to be different now"*. In this narrative, the desired outcome is focusing spatial developments on places that are naturally less flood prone rather than pursuing new housing on risky areas while pushing new flood defence measures. Regarding the Star-flood model this is a shift from flood defence towards a focus on risk prevention (Kaufmann et al., 2016). However, as the program manager climate adaptation of the province cited, the problem is that the "naturally less flood prone"

areas are likely to have already been allocated. If areas characterised as naturally more flood prone need to be developed, more measures are needed to ensure water safety. The province's climate adaptation programme manager says: *"If you don't include climate adaptation in your current developments now and you have to adapt these developments later, it will just cost two-three times as much money, that's really capital neglect you're doing. But anyway, that's what it is now."* Here reflects well the debate that is underlying in risk society: modernity and progress become part of the problem not the solution. Beck argues that in the tradition towards a reflexive modernity, societies will become increasingly cautious and reflexive when it comes to the negative externalities as a result of further industrialisation and progression. The risks that this progression will produce will fulfil a more central role than modernisation itself which is well reflected in the changing discourse on environmental issues.

Although, the different narratives show that not all respondents are unanimous. The other side of the story sees more advantage in technological solutions to deal with all the other challenges. The advantage today is that current technology is able to design urban environments in such a way that they are less vulnerable to natural or man-made hazards and better for nature and the environment. In the long term, developing in such way is even assumed to save resources and costs (Swart et al., 2014; van der Heijden, 2014). The developer interviewed is quite clear on this, he stated that you can actually build anytime, anywhere: *"You can always solve natural water by either building higher, or raising the dykes, or building water system sluices."* However, he does add that it is important to ensure qualitative plans that are resilient. The urban planner from the municipality of Zwolle adds that the consideration for flood risk management strategies is not simple. On the question whether you can build anywhere he answered: *"I find that difficult. I don't know if that is wise. Your heart says; no don't do it. My colleague in spatial adaptation always says you can live anywhere and I think so too. But how are you going to build in a polder eight metres below sea level? Of course it is possible, but are you just going to develop and build traditional houses out of the ground....?"*

5.2 Urbanisation

As discussed in the previous chapter, the urgency of the issues on climate change seems to becoming increasingly clear. Whereas one of the respondents somewhat exaggeratedly said that these days it is only about climate adaptation, this turns out not to be the case. The region has several tasks that do not always fit together seamlessly. When it comes to the urbanisation task, the Zwolle region has quite a few short- and long-term challenges. On behalf of the region, the respondent says: *"Around the city of Zwolle there is a big task where a lot comes together; in terms of housing, mobility as well as water. It is of course also an area of tension with growth on the one hand and flood proneness on the other. How can you deal with that?"* The topic of housing is increasingly higher on the political agenda and is therefore assumed one of the most important tasks these days.

Housing market growth

The policy adviser on housing and urban areas at Province Overijssel explain what the current state of the housing market is like: *"Zwolle, I think, has similar tightness in the housing market as in the Randstad. It is a city with a lot of ambition that is prominent in the eyes of the national government; with an urbanisation strategy, one of the large-scale housing locations, and as a NOVEX area. Of course, it is good that there is a lot of attention to it but at the same time, it is also a big challenge to keep everything on track and realise ambitions."* A big part of the region's urbanisation task is adding housing to the existing stock. This stems from the current tightness emerging in the housing market as already discussed in the theoretical framework. While it is increasingly difficult for first-time buyers in

particular to find housing, the pressure on politicians seems to be increasing to invest in realising affordable housing on the short term. The program manager liveability of the region explains what this means for short- and long-term ambitions for the region:

"What you see is that the challenge actually has two timeframes. That short term is a relatively short term until 2030 and that long term is actually from 2030 onwards. You just notice that the pressure is very high now. It is getting slightly lower already, but on the other hand there is of course a need for houses. You see that the emphasis is very much on acceleration and building a lot. But what you actually see in that picture of the future is that the curve actually goes down towards 2050. So that we should actually build less. Now the bet is on numbers and mass but in the long term it is also a matter of, as long as there is still demand, doing the right things."

Here, actually all interviewees agree. However, the need for exact numbers still seems to depend on exactly which forecast is chosen but until 2040, at least the realisation of 50,000 new homes should be taken into account argues the policy advisor of the ministry of internal affairs.

Several respondents cited that achieving these quantitative targets is seen as a risk to maintaining residential quality in a broad sense. This challenge is named several times as a division. On the one hand, there is the social pressure to develop new homes at a rapid pace, but on the other, the right homes have to be built, as cited by the province's spatial planning adviser: *"We have to solve the pressure on the housing market now. At the same time, we have to do that in such a way that we don't regret the houses we built during the 2020/2030 period. We don't want to end up with the wrong types of houses that don't fit the demographic trend of smaller households. Or even worse; that we regret in 2050 because the place where we built them overflows."* This problem is also recognised by the majority of respondents.

Greenfield versus brownfield locations

The further urbanisation of the region, with the city of Zwolle in particular, as an important transition, is mainly driven by the demand for more housing. The trade-off between brownfield and greenfield locations is also an important consideration with a view to resilience and liveability. The Policy adviser on housing and urban areas at Province Overijssel explains:

"I think in itself that the focus on brownfield development is a good line, you always have to be careful when it comes to taking up new space. I do think that, certainly in western Overijssel, you would have to expand. If you look at the city of Zwolle but also in other Overijssel cities, the municipality has asked; come up with key projects? Where is it going to take place? Then you see that a lot will take place within the city centre; Zwolle railway zone, Oosterenk, Zwarte Water allee, but also the city centre area. In other cities, too, you see mainly inner-city developments. But of course, Zwolle also has the large expansion district of Stadshagen, which will be finished in a few years. So I think you have to bear in mind that you won't be able to realise all those ambitions within the city centre. You have to be careful not to fill everything up in the city centre. Of course, you also need greenery in the city. Zwolle is at that crossroads, of course. You want the charm of a provincial city, but you also want to urbanise and densify. You have to find a good balance in that."

From the developers, the question also arises not to lose sight of expansion, otherwise future demand cannot be met. Besides the claim to space, the region's program manager liveability says there is another important argument for focusing on brownfield development first. After all, where municipalities used to be able to make money, exploitations nowadays seem to cost money mainly

when it comes to inner-city development. Realising new housing projects within existing city limits makes this relatively more profitable:

"What you saw during the Vinex period is that the focus was on building in meadows at high speed. That also had its advantages, there are a lot of people who are happy living there. But in existing urban areas, there are just so many challenges, and you can't solve them all with programmes and without too much money. You just need an investment engine to help that existing urban area meet the challenges. So I think it's absolutely vital to develop inner-city locations."

In addition, a focus on brownfield locations has the following advantage, explains the Ministry of the Interior and Kingdom Relations' policy advisor: *"It is especially densifying in the cores themselves because at least by doing so, you create proximity which contributes to the region's accessibility. because the region is still strongly car-oriented. To keep the region accessible, you really have to create that modal shift to other forms of transport."*

Mobility

The functioning of the mobility system is seen as one of the preconditions for further urbanisation, according to the policy officer of the Ministry of the Interior and Kingdom Relations. From various respondents, the mobility transition is therefore very strongly linked to the realisation of more climate adaptation. On the one hand, this is to be welcomed because of the more mitigating effect of switching to other modes of transport than the car. On the other hand, several respondents from the state and the region cited that it reduces the claim on space if car traffic makes way for cyclists and pedestrians. This offers opportunities to actually reserve more space for other tasks such as climate adaptation. *"You do that mainly by building around those cores, around public transport, with public transport hubs. We are working hard on that."* as the respondent on behalf of the region cited. Zwolle is seen as a city that relies heavily on car use, says the policy officer of the ministry of internal affairs. Keeping car traffic out of the city centre should make room for other tasks, such as greening and climate adaptation. Starting to change the car network, you can improve the entire urban structure in this way. However, this is a long-term transition. So says the urban planner of Zwolle municipality.

Qualitative task

Besides the fact that the Zwolle region is characterised by a high level of car use, the region also has a relatively large stock of ground-level housing with a front and back garden, which is obviously related to the high car use. The policy advisor housing and spatial planning at the ministry of spatial planning and housing confirms the need for a qualitative transition in housing:

"As far as the housing market itself is concerned, it is also mainly about building for the groups where the need is and not building in the segment of which there is already a lot in Zwolle; the one-family houses and the ground-level houses. I think the one- and two-person households should get much more attention in programming. They do get more attention now, but that also means that from that perspective you have to build in places that are attractive to this target group. "

This refers to the desire to solve the demand for housing mainly within cities to generate a more highly urbanised structure. Circulation within the housing market also plays a big role in this. For instance, the process manager of the urbanisation strategy notes that there is not really a good alternative for people who want to move to a smaller house in more urban areas. She asks herself the question whether you build for the current demand now, or for the demand of the future in which you see households getting smaller and smaller.

Uncertainty

Currently, the state of the housing market is quite uncertain. Developers, for instance, are talking about staff shortages, rising costs and a slight drop in prices and demand; *'We already know it's going to be difficult to complete projects'*. Meeting the quantitative task as it stands is becoming increasingly difficult. While the developer interviewed cited that brownfield development is necessary, there are some problems when it comes to feasibility. For instance, it is stated that acquiring land is a problem, mainly due to buying out current functions; *"If those costs are so high and the market is going to drop, in my opinion, that means that the difference between them is no longer that big, and projects are less likely to be feasible. I think a lot of projects are going to come to a standstill in Zwolle."* It is therefore important that these external factors do not slow down housing production. With unfeasible plans, there is a risk of cutting into additional interventions on climate adaptation.

5.3 Environment versus urbanisation

The urgency of urbanisation and adding additional housing seems clear to all interviewees. There are concerns about the prioritization when it comes to combining the climate challenges with the housing challenges.

"You see that there is a huge pressure on building housing. Where before we were very much concerned with thinking logically about the location of houses, and let's do that at our leisure. Now the pressure to add homes as soon as possible is so great that we tend to prioritise that. That pressure on the housing market does rub and friction with thinking properly about climate adaptive building. Even though we all shout that it is not."

So says the spatial planner from the province. Other respondents from the national government, water boards and municipalities, among others, also expressed their concerns about the emphasis on the accelerated addition of new housing: *"The challenge now is very emphatically to build more houses, but because so much has to change in order to live in a habitable country in the long term, you also have to think very carefully about how to deal with extra housing in the city, especially in greenfield locations."* Says a policy advisor of the water board. The province's housing advisor also admits that it is a real risk that we will accelerate and therefore end up paying less attention to climate adaptation and sustainability.

The focus on acceleration increases the risk of projects still being developed on insufficient locations or in a way that climate adaptation has not been considered in a sufficient way. On the one hand, this has to do with already existing plans that are at an advanced stage. These plans often only need a small push to start. From the housing consultants of the province and the state, it is both clear that there is a desire not to make any more major adjustments in such plans.

"These plans are easier to develop, which is why they find passage anyway. These are not always in locations you should prefer from a climate point of view. But for the sake of housing (and that's just a public interest consideration), they are still being developed. Also because there is political pressure on that side of the coin. You can still optimise within those plans".

Particularly in small municipalities, greenfield sites are more often used, according to the Overijssel province's planning consultant. Precisely because it is often easy to add the new homes there.

Conversely, from a housing perspective, there are fears that the focus on climate adaptation and sustainability will actually delay the achievement of housing targets. Within the same government, two tasks are actually accommodated that may conflict with each other in some aspects. From the ministry

of infrastructure and water management, the emphasis is clearly on climate adaptation; the interviewee says there is frequent cooperation between his ministry and the Ministry of the Internal affairs, which is in charge of the housing task. This cooperation is important because the easy-to-develop locations are not always the locations where you are going to develop future-proof. *"Our colleagues in the ministry of internal affairs are really hot on their heels about the number of houses needed, but they also understand the desire for resilient developments."* The lack of clarity around future climate change and what is needed for it is mentioned as a problem. That lack of clarity around climate conflicts with the speed needed to solve the housing shortage.

Brownfield locations as a solution

In the discussion at the intersection of environment and urbanisation, there is one argument that is frequently cited in various forms; the already built environment. The idea that new construction should be completely climate-proof, or should not take place in vulnerable places is somewhat downplayed by several respondents by citing the fact that the city of Zwolle is in already in a vulnerable spot in the delta. *"If you consider that properly from that multi-layer safety perspective, maybe you shouldn't build there at all; in or near Zwolle."* But from the other perspective, there are already a multitude of houses that are more likely to be in trouble than the newly added ones, according to the province's policy advisor on housing:

"You will also have to look within the existing parts to see what you can do there. If you look at Overijssel we are going to add maybe 2 or 3 per cent but most of it is already built. There may be even larger progress to be made there, at the same time it is difficult to intervene because those are already existing neighbourhoods. Of course, everything that is newly built now already complies the standards, the challenge lies in the old stuff. With new construction you will also contribute something but you are not going to solve the whole issue".

From the perspective of the urbanisation strategy, the view here is somewhat different. After all, new housing construction simply brings in money so says the program manager liveability: *"Make sure that that housing construction can remain as an engine to make investments in your area that are needed."* For that purpose, they developed the concept, 'nieuw helpt bestaan' (new spatial developments should help existing neighbourhoods). The policy advisor housing and spatial planning at the ministry of spatial planning explains, *"It is a balance between making the existing stock climate-proof in combination with new construction. Especially build where people are now too, because that can be an investment driver to make that existing stock climate-proof as well."* Spatial development within the city in relatively vulnerable places can therefore offer a solution, the existing situation should improve in terms of climate adaptation as a result of the new developments. However, it is important in this to keep an eye on the really low-lying and vulnerable areas; during peak rains, for instance, this is where the most water collects and damage is greatest. Therefore not all brownfield and inner-city locations should be developed into high densely urbanised areas.

subsoil as a starting point

Water and subsoil are gaining an increasingly prominent role in new developments especially given the current discourse in which climate adaptation plays an increasingly important role. One developer interviewed explains that it should become a way of working that is being moulded more than before:

"When you designate an area, you first have to look at your water management and landscape qualities and build your story from there. Not first look at how many houses it can accommodate and then, how are we going to solve climate adaptation? It's a different starting point. This starting point can also determine the design or your urbanity."

This is in line with what basically all the other interviewees also indicated. Although not everyone's focus on climate adaptation and water safety comes first, there is an awareness that a new way of working is needed. The preconditions and conditions created by soil and subsoil should be more leading. The urban planner from the municipality of Zwolle says he thinks that more frameworks should be provided by the municipality on the basis of these conditions and preconditions.

A transition to such a way of working often takes longer than hoped. When asked to what extent this new way of working has already penetrated the actors involved, the advisor to the Ministry of Internal Affairs cautiously answers that a transition is still needed. The policy on water and soil as steering principles that is now being made must be carried through to the provinces and municipalities. He cites that the principles for climate-adaptive development at system level as well as at district level are already on the table. These have already been mentioned in the theoretical framework. When it comes to knowledge on water and subsoil, the developer interviewed is rather sceptical:

"In the large urban planning agencies, this knowledge is present. I don't think in all municipalities, but in the municipality of Zwolle, for instance, it is. Less so with the somewhat smaller municipalities, I think, but they do hire people for that. The important thing is to do this from the start and not to think afterwards, how can we add climate adaptation? That's the wrong route."

5.3.1 Risk management strategies

When talking about water and soil in combination with the built environment, the multi-level safety model and the Starflood model with the flood risk management strategies play a major role. While the Netherlands is known for its high degree of flood defence due to the multitude of dykes and engineering structures that have to hold back the water, the need to adapt this system seems increasingly urgent, explains the water boards' policy advisor:

"We are actually finding that it is becoming increasingly difficult to maintain the system as it is now (the water system and everything that goes with it; dykes and rivers etc.). Both the river bed and dykes that have to be higher and higher. It's a continuous process. Of course, this is something we are used to in the Netherlands, that is the bit of social engineering. Meanwhile, we also reach a point where the country is so full and so much has to be done. How much room do you have to cope with a rising sea level, a rising discharge or an extremely low discharge? How do you adapt to a changing climate in the long term? You actually have to move away from the way we used to do things, which was pretty standard and quickly resorted to technical interventions such as water storage and hydraulic engineering. I think we have to move much more towards a landscape where not everything is possible and where you can simply get rid of the excesses such as too much water and retain it for the long term."

On this front, basically all respondents agree on the assumption that something needs to be done. A diversification in different strategies is needed, in which, depending on the situation, interventions can be made at building level but also at district or system level. According to Beck, current institutions are unable to cope with increased risks. This means that trust is declining in these institutions, which previously often relied on technological interventions. This seems to be well reflected in the way flood risk management strategies are regarded. The emphasis is shifting from flood defence towards risk prevention (Kaufmann et al. 2016).

The idea that more will have to be done on risk prevention as proposed in the Star-flood model seems to correspond to the growing perception of risk during the transition to a reflexive modernity as

described by Beck (1992). This does not directly mean that the Star-flood model is completely founded on the same theoretical assumptions as risk society theory, but the train of thought for Dutch case can be partly explained by this. For years, water safety and climate adaptation were sought in technological solutions (flood defence). The realisation that there will be limits to the social engineering of the system is a realisation that, according to Beck, comes with the advent of reflexive modernity. The result of this realisation is reflected in the shift towards a stronger focus on risk prevention when it comes to flood risk management.

Risk Prevention

As discussed earlier, this is the part minimising negative externalities through proactive spatial planning and allocation. In fact, this case study is about the location choice of new construction projects. Here, the demand for housing in and around urban areas is often contrary to developing in the most suitable location from the point of view of water and soil. The Overijssel province's housing consultant, for instance, points out that this is a difficult balancing act: *"You see that where the growth is now, it is only getting stronger. In peripheral areas, where you should actually build from a climate perspective, you actually see a decline of population. That's a complicated discussion, though."* From a regional perspective, it is mentioned several times that the probability and impact of flooding in the east of the region is many times smaller than around the city of Zwolle itself, but that does not match the demand for housing.

When you look on a national scale, the discussion actually becomes even more interesting, raising the question of whether developing in the Randstad is actually still sustainable, while demand there is much higher. The province's housing consultant says the following about this: *"These are legitimate questions, but I notice that in national policy and also in our policy this does not yet prevail or is decisive. If I look here in Overijssel you can ask yourself whether you should plan so much new housing construction in Zwolle or should you do it all on higher sandy grounds?"* So this shows that proactive spatial planning at the national level has hardly been implemented in policy yet. But when looking at the regional scale, location choice is increasingly a guiding factor. This illustrates that policymakers face increasingly conflicting interests. Does the importance of generating sufficient housing capacity prevail here, or does preparing for future risks take priority?

Stricter policies on location choice can therefore be a strategy when it comes to risk prevention. Similarly, the water and climate consultant at the Ministry of Infrastructure and Water Management states:

"If you look at the cities of the Netherlands, they are generally in the best locations. The centre of Zwolle is also higher up. We are not going to build new large districts directly along the IJssel. We do, behind the dykes but not in front of them. The difficulty is a bit that in the future there will be more extremes that will cause us problems. As long as those problems are limited (...) you can still choose the right locations within your polder or behind your dike."

Here should be added that locations without climate risks do not exist, there are risks everywhere.

"So don't go suggesting that you can find THE safe place and do nothing else. It is always a question of; always build climate-adaptively. Only how much you have to invest to be climate adaptation in terms of knowledge, time and money is less if you are going to be in the better places. So it starts with a good location choice and with the remaining risks that are there you have to take measures."

So that means additional flood risk management strategies have to be incorporated into the development in question. It seems, according to the climate consultant at the Ministry of Infrastructure

and Water Management, that reasoning is first based on risk prevention. Only then is flood defence recalled. In fact, exactly as prescribed by Kaufmann et al. (2016).

Defence

Flood defence has actually always been the spearhead of Dutch flood risk management strategies. But as already mentioned, this uses a large amount of space that is not available in urban areas and it is expected that this flood risk management strategy will become more and more expensive due to higher peak discharges. When asked to what extent we can continue to focus on defence primarily, the water boards' policy advisor replied as follows:

"Continuing as we are doing now, I think that will work but in doing so you are pushing the problem further and further forward. You can already see that the flood protection programme is becoming more and more expensive; it may still be economically viable but it is becoming increasingly difficult and expensive to keep up. The insight from the sea level rise knowledge programme is that changes are accelerating and the extremes are becoming more extreme. The time to reinvest is getting shorter and shorter, so you have to make adjustments faster and faster. You actually have to over-invest so that your interventions can last another 10 years but, of course, we don't do that either. We do exactly what is on the standard."

So continuing in current manner should be economically possible. However, there is a growing realisation that doing so will make future risks problematic. Being concerned with future risks now aligns with Beck's (1992) assumptions on the risk society. However, our flood defence should not be completely devaluated. In some areas, there is dire need for continued adequate investment in flood defence. Low-lying polders such as in Flevoland, for example, would no longer even exist at all without a well-maintained flood defence, according to the province's spatial planning consultant. The point is that the focus is not only on defence, but in the Netherlands there will always be a strong emphasis on this flood risk management strategy. As well as in the region Zwolle. This is because of the path dependence created by the use of these technical solutions that have enabled people to live in these vulnerable areas.

Mitigation

Because the water system in Zwolle has a high degree of flood risk, mitigation is already regularly resorted to in places where other strategies do not provide a solution. The water and climate advisor of the municipality of Zwolle gives a good example where the focus has shifted from flood defence to mitigation:

"What we have done at Kraanbolwerk, for example, is look at how this area can in itself withstand what is going to happen and that it is okay for there to be a splash of water there from time to time. Now of course that is outer dyke so that makes a bit more sense but actually we want that for the whole city. We know that our dykes in the inner city are no longer adequate so they will have to be raised from the traditional approach, but there is simply no room for that in the inner city. It is already highly urbanised there and we really only want to build more there. The question then arises: how do you do that? That can be done by saying that at some point the water is allowed to go over that dike."

The region's program manager liveability also agrees that good things are happening in terms of mitigation. In his view, there may have to be a completely different way of developing: *"What you actually see in the region is that we have to move with the water again. The vision is actually to live more with water instead of just holding it back. Of course, there are forecasts of floods once in a while, will you then close everything off or will we accept a certain risk and design the area accordingly. Whether it gets wet then we will see"*. The aspects belonging to mitigation as described by Kaufman et

al. (2016); urban green infrastructure, flood retention et cetera are by now familiar to most respondents. Especially in new construction projects, there is an increasing focus on such forms of flood risk management strategies.

Preparation

Preparation is closely related to awareness, the idea being that if people are aware that the region is situated in a vulnerable delta, residents themselves will anticipate it. Here you see that there really is still some improvements to make as confirmed by almost all respondents. The OECD (2014) has pointed to the so-called Dutch (public) awareness gap which still seems to be there. According to the water and climate consultant of the municipality of Zwolle, this is due to the attitude of the various authorities; *"We solve it, we arrange it for you citizens. You pay for that and that's why we can organise it, that's why you don't have to do anything else. That is just an illusion because with climate change, that strategy is just not sustainable."* The proposed solution lies partly in greater awareness and responsibility, they say. The responsibility can only not be placed entirely on citizens because many investments take place at system level. But things are also possible at the building level. For example, the urban planner of the municipality of Zwolle gives an example of a project where the initial flood management strategies proved inadequate, and were solved by preparation:

"So what they did was; raised all the electrical sockets and made big skylights so that if things went wrong, people could be lifted out with helicopters. That's your layer 3 multi-layer safety, that was experimented with 10 years ago. Those old farms that were situated in the low polders had very large stairwells. Because when they knew the water was coming, they quickly lifted up all the sofas."

He explains that when plans are discussed with the municipality in advance, this does become an issue. For instance, it is advised not to position vulnerable installations, like ICT, on the ground floor. Here, it seems that the respondents from this study contradict the results of Bradford et al. (2012) who argued that there is no direct link between awareness creation and the level of preparation. The importance of creating awareness among citizens was explicitly mentioned several times as an important aspect of preparing for potential flood events.

Recovery

When it comes to rebuilding or insuring vulnerable areas in the Netherlands, it is often difficult, mainly because the Netherlands has a low probability - high impact situation. This means that when things go wrong it also goes significantly wrong, however, the chances of this happening are extremely low. From an economic perspective, it might also be interesting in some cases not to regulate everything completely with flood defence or mitigation, but to accept that the occasional flood will occur. What some respondents did point out was that if more efforts are made to allow water in the city, there must be good compensation arrangements. The role of insurers in this should be well regulated, according to the Zwolle municipality's water and climate advisor. In the region, an increasing role of recovery is not yet present to this extent. However, most of the interviewees confirm that it is a good idea to have this flood recovery strategy in place when diversification becomes more widespread.

5.4 Management

Besides the substantive part of the issues between climate adaptation and urbanisation, respondents indicated that the way we deal with these themes is also of great importance. The system of involved actors and who bears responsibility for what, according to many respondents, is partly the cause of current issues. This means that this is probably also where some progress can be made. What emerges from almost all interviews is that it is very important to have more cooperation between the various authorities but also with market players who have specialistic knowledge. Similarly, the program manager of the region states; *"I think it is very necessary to start working as one government. After all, if for example the water board finger points to the municipality or provinces, that doesn't work. We have to do it together as a government (...) I do think we are facing some big transitions. Water and climate is one of them. It is almost impossible to organise administratively. It is so complex that sometimes people only half understand what it is about and who is in charge of what."*

Complexity

The system we have designed where climate adaptation and urban development choices intersect can be seen as tightly coupled, according to Perrow's theory of normal accidents (1999). The moment when something actually goes wrong somewhere, mistakes will follow each other in quick succession, this corresponds to the low probability - high impact situation as outlined by Kaufmann et al (2016). That the system in itself is not complex is confirmed by the water and climate consultant of the municipality of Zwolle: *"I don't think the water system is that complicated at all. There are some knobs you can turn and that's it."* However, this is about the substantive part of the system. When it comes to the way we manage the system in the Netherlands, many respondents indicated that the system is actually quite complex: *"A lot of things in the Netherlands are complex with permits and preconditions. In part, you choose that together because you want a certain quality"*, says the urbanisation strategy process manager.

It seems very difficult to change the working method of a system that is so administratively complex, as the water board's policy adviser confirms. *"It is difficult to get it broadly accepted by the executive board or provincial councils (all of which are somewhat further away than the initiators) and to make it fit within the democratic system as we know it. When it is no longer so black and white, it does get complicated. On the one hand, I am very much in favour of cooperation but, on the other, it is also very much focusing on what you are really responsible for."*

Responsibility

As cited above by the water board's policy advisor, an issue of accountability arises when abandoning the existing system. Of course, this is an understandable response. As the water and climate policy advisor of the Zwolle municipality explains, *"The water boards' right to exist is water. And the right to exist is derived from having a certain share of those interests in their hands."* When asked who is responsible for achieving water safety, respondents give two different answers. In purely organisational terms, the answer is often given that the water boards and Rijkswaterstaat are primarily responsible. However, in almost all cases it is added that this is a joint responsibility. Similarly, the national government's water and climate advisor stated: *"That responsibility is just very much a joint one. It is a good thing, though, that we are getting tighter on not only your responsibility but also on targets. You can only talk about responsibility if there is a clear guideline. Actually, that is also the responsibility to make clear agreements there, which is where I still see a role for the state."* This is in line with the way responsibility is written about by Beck (1998) and Giddens (1999). Responsibility goes hand in hand with making decisions and their consequences. Beck advocates not ending up in a state of organised irresponsibility. To avoid this, it is imperative that institutions acknowledge the reality of catastrophe. Because in the current system everyone bears a share of joint responsibility, there is a

chance that eventually no one will take responsibility. This may already be the case at the moment, according to the province's spatial planning adviser: *"You see that even though you would say the water boards are responsible here, all three layers of government have an interest in it. So you find that ownership is complicated and not logically invested in one party. That makes it a bit navel-gazing at each other now about who is really going to do it. While we do realise that we really need to do something now."* This confirms that it is of considerable importance that responsibility will have to be taken by the actors involved, to avoid the state of organised irresponsibility as described by Beck (1992). To avoid that state of organised irresponsibility there should be one stakeholder who actually owns the problem, which is not the case at this moment.

Ownership

The dispute around ownership of the issues about climate adaptation and urbanisation is also related to shared responsibility. Because there is not one actor clearly responsible for realising climate adaptation as a whole in the region, the Zwolle municipality's water and climate advisor admits:

"I don't want to put it in too black, but that is really badly organised now. As in, we are all working on it and we have endless debates and conversations with each other (...). There is no single layer of government with responsibility for the entire system. We don't get out of that and as a consequence, as a municipality, you have to be quite strict in your area and spatial developments."

When asked which actor should own the problem, none of the respondents had a sufficient answer. However, shared ownership was again pointed out, as was the case by the province's spatial planning advisor: *"I think it is rarely the case that only one party has ownership. It is always a connection between different governments. So there will always be at least two layers of government involved but you will have to take one that equips you enough to actually get the others on board, financially but also legally."* This is the common pitfall of the whole concept of multi-level governance: no one is actually in charge, which is its strength at the same time. The solution to this problem that is often cited is working together as a government. However, this remains a difficult balancing act between organised collective responsibility and organised irresponsibility. The Zwolle municipality's urban planner points to the strength of the region. He indicates that the issues call for cooperation. However, as noted earlier, that cooperation is hindered precisely because there is no clear owner of the problem:

"Everyone working on water is thinking within their own institutional boundaries, with their own investment agenda and mandates. Our current problems transcend all those administrative or managerial boundaries and require cooperation. That doesn't happen automatically, let alone that those parties will agree with each other on who does what and what can be done together."

This is what makes the organisation of the system complex according to Perrow's normal accidents theory (1999). The advice here is to steer towards centralisation so that quick intervention can be done when needed. That would mean that would mean that the role of the state would increase, the question here is whether that is desirable or not.

Compartmentalisation

When it then comes to cooperation, the problem of compartmentalisation between governments but also within governments is often pointed out. The accusation that is repeatedly made is that different departments are often not aligned. 'Working together as one government' again seems to be the challenge in this. The problem is clearly explained by the policy advisor housing and spatial planning at the ministry of internal affairs: *"People think very much from the perspective of their own tasks, without*

having an eye for the broader interests that can be linked to such a task. That is another thing you encounter everywhere in governments. Everyone has their own piece of reality and tries to be as effective and efficient as possible." Several respondents gave examples of this. For instance, explained by both national government respondents that there are regular discussions between the two ministries because they represent different interests. Another example was provided by the process manager of the urbanisation strategy : *"What we did notice in the urbanisation strategy is that people, the experts on climate (...) find it difficult to make the relationship with spatial developments. To translate water and soil steering spatially, they really find that very complicated. While of course that is what it is all about."* While all respondents recognise the phenomenon of compartmentalisation within and between governments as a problem, this obviously does not apply to all cases. There are several examples of good cooperation, according to the climate adaptation advisor of the municipality of Zwolle; *"I think that within Zwolle we do that very much together with the province so that goes reasonably well but actually you are not looking at the whole system. "* The focus should be more on the system as an integral whole.

Integrality

This is probably one of the key words when it comes to the issues surrounding urbanisation and climate adaptation. All interviewees stressed the importance of integrality. Whereas on the one hand, integrality can speed up the realisation of housing because front-end cooperation allows one to shift gears earlier and avoid hick-ups. On the other hand, it is simply necessary to work more integrally to face the future challenges around climate, precisely because such interventions have so much impact on other things like agriculture and nature management. The province's housing consultant himself indicates that climate adaptation is not entirely within his purview, while also acknowledging the importance of integrality.

"I think you then have to work integrally and coordinate well. The prospect then, though, is that you are just tuning in at very long tables. Steps have to be taken. It's always a matter of finding the balance, on the one hand you have to make the right connections, which sometimes goes wrong. You have noticed yourself that when you walk around here, it's quite a big and complex organisation."

5.4.1 Role of actors

From what is described above, it appears that there is still progress to be made in mutual cooperation. The multi-level governance structure consists of various layers of government and market players that together ensure the realisation of urbanisation but also climate adaptation. This multi-level governance structure is not expected to change in the sense that new actors will be added or that actors will disappear. The exact role actors take on and the corresponding responsibilities are, however, expected to change. The role of the national government is mentioned a lot in terms of the central control that may be needed in light of the lack of ownership (Perrow, 1992). In particular, the role that water boards will have to take in the future is cited many times by respondents. The water board's policy advisor agreed that their role as cited by different actors is indeed changing:

"I think there is also an issue of who does what in this whole thing. The water board always deals with a very defined thing, a dike or a pumping station but actually you deal with too much or lack of water and water safety. That can also be done in very different ways. How do you do that within the structures we have, who is responsible for what. Those are questions though, by asking those questions again in the light of a system where water and sol are more steering."

State

When it comes to the role that the state now has, the criticism is often that the state has lost control of spatial planning and should take it back. *"The direction on the whole is completely missing now. I think a new role for the state is needed. (...) The state should be responsible for how the layers communicate with each other and how knowledge and content is transferred between those layers and how that is organised."* So states the water and climate advisor of the Zwolle municipality. Precisely because the national government is able to transcend regional interests. This reproach is known to the ministry and a turn has been initiated in which this demand for more central direction is answered so cites the spatial planning policy advisor of the Ministry of the Interior affairs:

"Now you see that there is a need for more centralisation, this need is of course very ambivalent among provinces. On the one hand, there is a call for the national government to also take co-responsibility. But at the same time, provinces naturally want to keep hold of the steering wheel. In that search for balance, we are now a little bit in."

It was emphasised that it is not the government's intention to sit on the provinces' position. The provinces generally have more knowledge about the region. The intention is to achieve something with a 'promising perspective' and making resources available through dialogue, says the policy advisor on behalf of the ministry of internal affairs:

"By very emphatically indicating to the provinces what we think they should take into account in their spatial plans and in laying down their spatial puzzles. A lot of tasks are now coming together. These ultimately have to be solved spatially. Aspects such as soil and water management are simply part of it, including the instruments and guiding frameworks that will be developed by the ministry of infrastructure and water management. These are very important principles and solutions that provinces have to work with. In that sense, we are getting more and more at the wheel to deal with this in a different way at provinces and water boards."

The climate adaptation adviser at the Ministry of Infrastructure and Water Management says that in addition to the demand for guiding frameworks, there has also been a realisation that his ministry has a substantive task. He foresees that this will be a project that will take several years and will be increasingly linked to managing spatial planning at the national level. However, criticism is also coming from various actors. The most prominent point of criticism is that, due to the decentralisation of policy in the past, there is actually not enough specialist knowledge left in the various ministries. The urban planner of the municipality of Zwolle, for instance, argues that this is a problem in the case of the housing market: *"On the housing market, it is the national government that should take the lead there. But if you look at those ministries, you see that they lack the substantive knowledge."* The developer interviewed also expressed some doubts about the role of the national government on the housing market. In particular, the new minister's plan to liberalise the middle rental market did not immediately have the desired effect, according to him:

"The investors all hit the brakes then, they didn't step in anywhere. We also suffered from that. Everyone suffered from that. The consequences had not been fully thought through at the time, as a result of which a lot of projects stalled. I think it was the right thing to do, to introduce that. Only it was a bit rigorous, it should have been a slightly softer landing but maybe that's not possible either. Those guys must have thought about it."

No specific criticisms were raised about the specialist knowledge in the field of climate adaptation. However, it is important that if there is more steering in the field of spatial planning, water and soil,

that this is well integrated on a national scale. Otherwise, decent policies can never flow through to lower levels of government.

Province

The Zwolle region covers parts of four different provinces, with the largest and most important part of the region falling under the province of Overijssel. The importance of multi-level governance in this is endorsed by the ministry of internal affairs advisor: *"You cannot separate national policy from the measures that also need to be taken at regional level in relation to provinces. That connection means you have to do this as one government, that requires interplay between regional and local level, that is very closely intertwined to achieve future-proof climate policy at the local level."* When it comes to the role of the province, first of all it is one of knowledge institute. For instance, municipalities can come to the province with their tasks related to housing construction and climate adaptation. On the other hand, the province is the actor that responds to the relationship between municipal and national levels. Similarly, the province's spatial planning adviser says:

"As a province, you have a major role precisely when it is above local. It could just be that you have to do something higher up in the water system or on the Sallandse Heuvelrug to make things easier in Zwolle that you can't leave to municipalities. It's really about system approaches. You see that if you start looking at your planning in a really different way and you really start letting the natural system guide the choices you make, that does require some supra-regional steering or direction. (...) You do have a role in this because the issue is so cross-bordered that municipalities will not do it themselves anyway. You have a task there as a province and water board. Water boards are interesting in that because then again they don't stick to provincial borders."

Water board

As cited above, water boards do not abide provincial boundaries. There are four different water boards in the region that have parts of the region under their authority. The interviewee is a strategic policy advisor at the Drents- Overijsselse Delta water authority, the water authority that has the IJsseldelta near Zwolle under its authority. The interviewee also represent the other water boards in the urbanisation strategy and the Novi area. In their current role, all water boards are executive bodies. For centuries, their right to exist has been derived from organising the amount of water and water safety. *"Look the water board is just an executive body, they are given a mandate and have to do that. They are little forward-thinking. They are little involved in policy development. They often implement what is imposed from the state or province."* Said the water and climate advisor of the Zwolle municipality. The Ministry of the Interior's policy advisor adds that they should actually work smarter and more integrally, but that proves difficult: *"Those are complicated discussions where water boards say; our responsibility stops at sober and efficient, that's our responsibility and if you want more? Then we are going to think something of it and you have to pay."* The current policy is characterised as sober and efficient. The water board's policy advisor explains what that means:

"We are now primarily on the first layer of multi-level safety (flood defence). To keep it clear and easy, the Drents-Overijsselse Delta water board stays with that. If you abandon the course and focus much more on the good organisation of an area, then you arrive at a very unclear area of who is responsible for what? Getting that broad support from the executive board or provincial councils is quite an art. On the one hand, I think I am very much in favour of cooperation, but on the other hand, it is also very much about focusing on what you are really responsible for."

Actually, this is the big dilemma: the water boards are more than once characterised as; a collection of technical water managers. That to change, according to the spatial planner who spoke on behalf of the region: *"As long as the water boards are not also given an objective for spatial quality, like with room for the river project, they have to make do with what they have. When it comes to talking about climate and water systems, everyone does feel that the water board should be looked at while the water board cannot actually live up to that now."*

The overall view among all respondents on the new role of water boards is clear. To cope with future risks, it is important for water boards to have a broader orientation towards spatial planning. However, this is not at all in the DNA of our water boards, according to the Ministry of the Interior affairs' policy advisor on housing:

"Getting water boards to be partners in area developments has always been very complicated. That is not a natural attitude of water boards; to act as partners with other governments in a development. (...) We are now also addressing them on their other responsibility to also think something (which is very complicated for them) from the perspective of water safety in the domain where they are actually not at home; namely the spatial domain."

The province's spatial planning adviser explains that it is these integral considerations that now become so important, because these considerations have so much influence on other matters such as housing, agriculture and nature management. Water boards are not used to working like this; they essentially employ water engineers and not spatial planners, he argues. That the role of the water boards will eventually has to change in order to better cope with uncertainty and problems resulting from a changing climate in the future is also known to the water board itself:

"It does force the water world to think about what you are really about. How do we position ourselves and what do you participate in, what don't you participate in. And if you participate, do you only provide knowledge and content or are you really an actor because you also see a task for yourself. It is inevitable that you need to have that conversation. Not only the water board has to look in the mirror, but also the municipality and the province. Ultimately, you have to work together."

Eventually, spatial planning will never become entirely a task of the water boards. But in order to diversify flood-risk management strategies, a change in the current system of multi-level governance seems necessary. Here again, where the water board is primarily responsible for providing water safety, this is usually done by investing in the first layer flood defence. There are opportunities here for the water boards, according to the water board's own policy advisor:

"I think that if, for example, a high-water protection programme not only looks at dyke reinforcement but also takes a broader view, based on the concept of providing water safety. It is perhaps also a bit about the scope we have now. I think the broader approach and continuing to look for each other in that is important in existing programmes."

Basically, the whole debate comes together neatly in the question of a new role for water boards. This question arises from the idea that through integral cooperation, diversification can be achieved in flood risk management strategies. This should result in better prevention of future risks. However, at the moment it seems almost impossible to adopt this new role for water boards because we are locked into the current structure of responsibilities.

Municipalities

Municipalities are essentially responsible for drafting and reviewing zoning plans, making them the government closest to residents and developers. Policies made regarding climate adaptation or building more housing therefore always land with municipalities, which makes municipalities still responsible for climate-adaptive building. Whereas municipalities used to have a revenue model by transforming agricultural land into urban areas, the emphasis is now much more on inner-city brownfield development; *"Land exploitation has become heavily loss-making instead of profitable. So we do have to look at that in a different way. It's no longer just making sure regulations are in place. That's where you see lower authorities getting into trouble. Sometimes they just need money."* So says the Overijssel province's spatial planning adviser. This also requires a different way of working for municipalities. In the end, municipalities too have to go along with a more integral way of cooperation, which allows projects that may not initially seem profitable to get off the ground after all. Integral cooperation actually leads to innovation, explains the Zwolle municipality's water and climate consultant:

"I think we have done a lot of cool things already. In Weezenlanden, we also have houses that have a dam in them here in Zwolle. (...) I think the transition is possible here in the region. In Zwolle we already have good examples, in other parts of the region this is starting to come more and more. Because you have very short lines of communication here in an informal way."

One of the most frequently heard objections from actually all layers of government is the lack of personnel, as a result of which tasks do not get off the ground as quickly as desired. This is firstly due to a quantitative shortage of personnel, but it is also related to a shortage of specialist knowledge. According to the urban planners of the municipality of Zwolle: *"Here, we know very well what the task is and how to organise it. And then you talk to some smaller municipalities and they don't really have an idea yet what their contribution can be to the whole water system. In those small municipalities, my colleagues work their tails off."* From the region, staff shortages are also noted. The planner from the region notes that especially in many different small municipalities, officials perform almost the same tasks;

"Well you can already see that many municipalities have similar ambitions. The question is then whether all those separate municipalities, all need separate officials working on the same things. Or can we also do it smarter? If someone is good at something in one municipality and good at something else in another, let's combine them. But again, that is complicated."

In addition, he mentions that the smaller municipalities in particular are very strong in involving citizens, although the smaller municipalities also have to go along with the transitions that are so large and complex. It is difficult to go through both of those, which is why he argues that something needs to be organised around joint implementation power."

Region

The Zwolle region office focuses mainly on economic cooperation and accessibility. In addition, the region has obviously played a prominent role in the urbanisation strategy, which makes it relevant in the spatial domain as well. However, on the climate issue, the region is not yet really involved. For instance, the process manager of the urbanisation strategy states;

"Climate adaptation was never that big of a deal there. When we started with the urbanisation strategy, we actually discovered that there was hardly any cooperation at the spatial planning level within the region. Everyone just did their own thing and of course the provinces sat over

that as a guiding framework but the region didn't really do that much in it. The region does want to be a climate robust region but the region organisation didn't steer that much on that."

The region's influence on spatial planning is quite important in the form of the urbanisation strategy. However, the region does not seem to play a significant role in climate adaptation apart from their role in the spatial domain, as stated by the process manager of the urbanisation strategy:

"The region does want to steer more towards cooperation in spatial development and this does play a role in that. It is also the responsibility of the provinces and municipalities themselves, they make the policies. The region does not make policy itself. The region mainly makes agreements with the state. It's mainly about how to work together, more how do we make a fist. How do we start the lobby. That is what the region is mainly doing so far."

Developers

Developers are ultimately the executing factor when it comes to realising the required amount of new real estate to make up for shortages in the housing market. However, the targets as formulated earlier seem to be reduced not only by ambitions regarding climate adaptation but mainly by economic aspect, according to the interviewed developer: *"That will be a difficult task, especially nowadays. Look those construction prices are through the roof. That's really absurd, what we have to pay for raw materials these days..."* Additionally, he mentions that the focus on developing brownfield locations also impacts their revenue model. Besides the fact that the costs for developers are often higher on brownfield locations because these are tight on space, the purchase value of land is relatively more expensive than on greenfield locations. This results in unprofitable exploitations or transformations simply not going ahead. The interviewed developer expresses his concerns when it comes to achieving the quantitative building task in the region: *"I think a lot of projects will come to a standstill in Zwolle. And that only Stadshagen will go ahead. As a municipality, you can still do something with your land prices there, you can lower them if that fits in with your land exploitation. I think Zwolle should designate a new expansion location as soon as possible to meet that demand."*

Developers are spoken of with a certain suspicion by many officials interviewed. Particularly because their revenue model benefits from the current shortages in the housing market. In addition, the general opinion about developers is that their goal is not the future-proof development of the built environment, but rather making a profit. However, the region's living environment programme manager partly nuances this:

"Of course, it is difficult because a developer has to make profits. You can say they should make less profit, but they should still be able to make a profit and cover risks. Ultimately, you do need market parties in that. At some point it has to become a matter of course. The question is also what kind of answers does the market have for the required transition? The market also just has to become part of the transition."

That developers also have an important role to play in the transition towards more resilience in the Zwolle region is also endorsed by the developer interviewed: *"It's a starting point and a way of thinking. If you develop a residential area in which you can make beautiful water features but still keep your feet dry. Or you have a neighbourhood where once every so often you are flooded and have to clean the living room again, that's something completely different."*

5.5 Transition

From what is described above, it is clear that some kind of transition is needed to cope with changing problems in the future. It seems that the current system and the responsible actors involved in it are not yet prepared to shape this properly. The big question guiding this transition is rightly asked by the water board's policy advisor: *"How do you combine such a climate task with other tasks, that is of course the big issue."* And the essence of this has already been described in the changing discourse around climate and urbanisation. The general view is that the limits of the social engineering of our system are coming into view. This realisation, as predicted by Beck (1992), will become increasingly widespread with the entry of reflexive modernity. However, the nuance in this should be emphasised. At project level, a lot of things can and will be solved technically. Also economically, a lot can still be solved with technical interventions, but in order to make the system more resilient to potential risks, the role of water and the subsoil is becoming increasingly leading in area developments. Which so far corresponds to diversifying flood-risk management strategies. The emphasis on other strategies of flood risk management is increasing in respect to the former strong focus on flood defence, which is healthy for the overall sustainability of the Dutch water and soil system (Kaufman et al., 2016).

The Overijssel province's spatial development adviser says that he does see momentum to initiate the transition to a system that relies less on technical interventions and takes more account of the natural presence of water and the subsoil:

"The drought we are having now and precisely the flooding we had last year in the middle of summer due to extreme rainfall does show that our current technical approach has done well for years but is no longer holding up. But at the same time, there is no denying that it is still a very technically regulated system that we have. Of the water we have, we determine to the cubic metre, so to speak, how much we let into the IJssel. We determine the level on the IJsselmeer and we are not going to let go of that either. The context remains an interplay between nature and technology."

This applies to the system of water and soil as a whole. But particularly in the area of existing construction, new construction can offer a way out through the credo; new helps existing. In this case, there is little interest in letting the natural system prevail, he says:

"Then it's much more; how do we ensure that we make the necessary system adjustments to actually build through the mistakes we made in the past in Zwolle, where it is now. To correct that, to be able to sustain that. That means we might have to do something higher up in the system, retain more water, allow streams to re-meander, more sponginess that sort of thing. That may require quite large investments."

Broadly speaking, actually all respondents agree in one way or another with the idea that water and the subsoil should be given an increasingly important role in our system of development. The water and climate advisor at the Ministry of Infrastructure and Water Management nuances this in a way that clearly distinguishes the extent to which different actors agree;

"On the one hand, you can say; we are moving towards a natural system with water and soil in a more leading role but if you really want to have a natural system you have to cut all the dykes tomorrow and we won't do that. But there are those who say you have to allow water much more and we have to build very high, which is one end of the spectrum. On the other side, you have people who say; we should mainly use some smarter places but we should mainly continue with the dykes and our primary defences. We can continue to live just fine everywhere in the west of the Netherlands in all the polders until 2300/ 2400. That is the other side of the

spectrum. Probably the reality will be somewhere in the middle. I wouldn't say it's about opposing but rather that there are two different views."

These two different views can be well explained using Beck's (1992) risk society theory. According to Beck, we are in a transition towards a reflexive modernity, characterised by a growing awareness of risk. Awareness of flood risk is assumed to be part of this. However, the transition is not completed, which explains why some of the respondents still partly agree with the view that we can continue to build in vulnerable areas for a few more decades. The vision that belongs to the first modernity and is based on the creation of wealth through technological interference.

5.5.1 Opposition

Even though the majority of interviewees broadly agrees on the assumption that something needs to be changed about the way in which spatial development is done, there seems to be resistance somewhere in the system of actors involved. Several respondents therefore wonder why the transition has not been initiated long ago. There seems to be resistance somewhere to this transition in which water and soil should give more direction to spatial developments, leaving aside the necessary nuances as already discussed. From the respondents, there are several aspects that emerge that could explain the resistance to this transition. The cause that could explain was just cited by the policy advisor of the Ministry of Infrastructure and Water Management. When it comes to resistance or opposition to such a transition, this does not necessarily have to be active resistance, he adds: *"So far, I haven't really come across people who are actively opposing it. Every now and then it does come down to what priority you put on it. If you always put it behind other priorities you are not actively opposing it but rather a bit passively."*

Priority of tasks

Prioritising other tasks over the realisation of climate adaptation and resilience is something that recurs in many interviews. Climate adaptation and the realisation of a resilient environment is not a priority in all cases, the water board's policy advisor also states:

"In this region, there is definitely room to discuss climate adaptation and how to do it climate-proof? But when I see what is going on in municipalities, it is mainly mobility, working and housing. Climate is also a thing there but really gets less attention. In practice, the established order is of course very tough and very rigid, so if you come up with something new, especially given the tasks at hand, it is only one of many."

And somehow that probably makes sense. There are certain frameworks that must ensure that new developments are resilient and climate-adaptive, but realising climate adaptation is not an aim in itself, according to the water and climate advisor of the municipality of Zwolle:

"It's the basis, but above that there are dozens of layers that have to communicate with each other. You can say: 'Oh, we think water and soil are super important and that will be the guiding principles', but not enough thought has been given to what that means for the other layers. The dynamics, social issues and challenges are on those other layers. Those problems are on mobility, on housing (...). The problems are not on water and soil, even though it is a very important precondition and it is very important to have this on point so that those other things happen in a good way."

This seems to be one of the main reasons for resistance. If water and soil are a prerequisite for the proper implementation of other tasks, a discussion soon arises if the interests of the task in question do not coincide with letting water and soil be steering. The process manager of the urbanisation strategy also points out that it is difficult to translate water and soil into guiding spatial planning:

"Everyone is very good at drawing up preconditions or starting points or development principles. You also have the QuickScan and that Room for Water project about where you can and cannot build or what measures you have to take. Then, of course, you see that you have to take more measures in one place than another. But of course you also have those kinds of principles for mobility or urban planning et cetera, but it is difficult to combine them into what that means for spatial development."

This nicely shows that not everyone has climate-adaptive development as a top priority. In addition, the tasks at hand have an increasing claim on space, explains the Ministry of Infrastructure and Water Management's climate adaptation policy adviser: *"The difficulty with that is just; such huge space demands with all the different transitions makes it very easy to say; water and soil must be guiding and homes must adapt to that, but in practice we just have limited square metres. Then the energy transition also needs somewhere and we also need more nature, and agriculture also needs somewhere."* So this is a puzzle where space actually needs to be freed up for climate adaptive measures, but that space is actually not there because there are numerous other transitions that also take up space.

Existing interests

Clearly, there are many different interests at play when it comes to the claim on space. And besides the fact that, according to several respondents, more space will also be needed in the future for such tasks as housing and mobility, actors also have an interest in preserving the current situation. There is one occupational group that is often mentioned when it comes to actively opposing a transition in which water and soil should be more guiding; farmers. Among others, the policy advisor water and climate from the municipality argues: *"The impact on agriculture is just huge. We are now talking mainly about nitrogen but also from water and soil steering or the Water Framework Directive, there is still a lot coming at that agricultural sector that is going to turn their current way of working enormously upside down."* Besides farmers, nature organisations are also mentioned by the province's spatial planning adviser: *"There will probably be some nature organisations that are not yet ready for it, because this will also mean something different for some nature areas."* In addition, other stakeholders are mentioned; property developers and landowners. Here, it is ultimately a matter of who pays the bill and who bears the risks, is the perception of the Ministry of Interior's spatial planning policy adviser. According to the living environment advisor of the Zwolle region, this resistance also plays into the hands of administrators of different layers of government. One has to be able to sell the new approach, he states: *"Even though there is a very small chance of something happening, we are going to make a good climate-proof design. You have to be able to sell that story. The moment one does not have an immediate interest in it, administrators do not dare to do so."*

Resources

Resources, as explained in policy arrangement theory, are not only financial resources. It is a broader view of resources including, for example, specialist knowledge or available personnel (Arts and Van Tatenhove, 2004; Hajer, 1995; Liefferink, 2006). Within this factor, there are two main aspects that are important when it comes to hindering a transition towards greater resilience. The first one cited does deal with financial interests. For example, the developer interviewed explained that plans do not always have the financial room to realise all ambitions:

"Especially in a down market, it is of course difficult. Then you start making concessions to keep things going anyway. Then things get swept away. Look you can't want everything; do you want and sustainability, and climate adaptation, nature inclusive, you name it. We all like that and everyone wants that, governments but so do we. Only in the end you have to make a trade-off with what you think is important. If you do this you have to do something from concessions

there, so if you want something like that as a municipality you have to anchor that from the very beginning."

The Ministry of the Interior's spatial planning adviser also argues that there is resistance on the financial front: *"That resistance lies in financial interests, with developers and the water boards, which are still tasked with sober and efficient water management. These are objectives and mechanisms that make you wonder whether they are resilient and whether sufficient account has been taken of other concurrent interests that are interesting for the solution you choose."* In many cases, linking opportunities can offer an integral solution to an existing problem. An outcome that is often more advantageous financially than if actors try to deal with their own problems sector by sector. The problem here is that investment streams are often also very sectoral, according to the process manager of the urbanisation strategy: *"To use one money flow to achieve the same goal but for which it is not directly intended is still a thing."*

When it comes to financial resources, there is also always a selection of respondents who cite that investing in climate adaptation in advance is actually more advantageous in many cases. This has to do with the positioning in time of your investment, explains the climate adaptation programme manager of the province of Overijssel: *"If you don't include it in your current developments now and you have to adapt these developments later on it just costs two-three times as much money, that's really capital neglect"*. This is exactly what is written in the scientific literature: Even if measures to climate-proof an area would increase costs now, they would prevent damage in the future. Taking climate change into account, such as sea level rise and higher precipitation levels, will prevent large-scale flooding and the resulting high costs for restoration in the future (Swart et al., 2014, P.68). The region's living environment programme manager goes a step further, even claiming that climate-adaptive development actually saves money: *"You can say that climate adaptation costs money, but I bet that if you design areas more climate adaptively, and you dare to make sharp choices in this, it doesn't cost any money at all. Indeed, that it might even be profitable."* In essence, of course, there is a grain of truth in this. In many cases, climate-adaptive development of an area ensures that any damage caused by flooding, for instance, will be reduced in the future. Indeed, if in this the costs are exceeded by the costs saved, it becomes profitable. In many cases, however, the benefits only materialise much later than the initial costs, but this does not have to be a problem according to the majority of respondents.

Besides financial resources, there is another important issue at stake. Many governments are facing a shortage of human capital. Among others, it is mentioned that water boards, provinces and municipalities have large personnel shortages. This results in delays, according to the climate adaptation programme manager of the province of Overijssel *"This manifests itself in the sense, from the province and water boards but also municipalities, that we cannot keep up with the tasks. That we just don't have enough people to do all the work. Anything we come up with, we have no problem getting a yes to it anymore"*. There is also a relationship with financial resources in this, it is said. Indeed, there is more and more money available for physical projects but process money to connect people and processes, therefore people are short. If I could hire staff on that to bring in the European grants, I could do a lot more. But that is not allowed because I don't have the money to hire people, says the province's climate adaptation programme manager: *"In itself, there is enough money, I could arrange millions more in an instant, only I don't have the capacity, myself or my team, to come up with concrete projects there or to connect that with other projects."*

Unclearness

Several respondents indicated that the problem with climate change and its consequences is that there is still a lot of uncertainty, according to the climate adaptation advisor of the Ministry of Infrastructure and Water Management: *"But before we really know what the consequences are from climate change, it will be 10 years later. It remains to be seen whether we will know it all by then. It would be nice if everyone would wait for us but that's just not going to happen."* That makes it difficult to state that, for example, building should not be allowed in certain places because there might be more flooding in the future. Especially if other policy advisers make the same claim on that space. Numbers of houses needed, new roads to promote mobility or placing wind turbines to meet energy supply is much clearer, he adds. All respondents agree that extremes will increase in the region but the extent to which is difficult for many respondents to realise. The region's living environment programme manager cites that this will require a different way of coping:

"It is a bit of a question of how extreme the extremes will become, but the Zwolle region in particular will have to move much more with the water. Maybe it will be along but maybe not. I think the framing we have to get in this region is that we have to learn to live with that uncertainty. And so that we really need to develop adaptively."

From the province, however, the climate adaptation programme manager contradicts this ambiguity. She argues that through the run models, it is actually reasonable down to grid level of a metre to see what will happen in a worst-case scenario. Only you can't predict when that scenario will present itself. This may also be the ambiguity that many other actors will continue to have difficulties with.

Standardisation

One of the impeding factors at the moment is the standardisation that is leading when it comes to water safety. The big problem here is that at the time of investment, the standard is often adhered to exactly. This is legally fine but actually the lower limit of what an investment should deliver. In view of more extremes and a changing climate, you should actually over-invest so that your investments are future-proof, even with the expected changing situation ahead. However, the water board's policy advisor has no idea yet what such an above-normative framework should look like: *"It is important, though, otherwise you get municipalities and developers saying; we meet the requirement, you can't enforce more."*

This standardisation also makes it difficult to invest in your water safety in a different way, with conservative recourse to flood defence just to meet the standards, according to the water board's policy advisor:

"You have to meet the standards. At the same time, you see that a lot is going to change, or a lot more is coming. Are you going to be above the standard or should you look further away? The flood protection programme is typically one of those programmes that has to make metres, the pressure is only increasing to do so. Then you don't take a broad view that only complicates things. But what is leading, the funding system or what you want to achieve? But of course you have to keep making metres because you have to meet the requirement at some point. You are in the tunnel so you just have to keep going."

Law and regulations

Law and regulation are mechanisms that enables actors to control the spatial environment and water safety. In the transition in which water and soil must become more guiding, the question of how this can be better safeguarded in laws and regulations soon arises. According to the majority of respondents, the impediment lies more in the fact that these safeguards are not sufficiently in place

at the moment. However, some interviewees indicated that laws and regulations might actually hamper the transition, as the water and climate consultant from the municipality of Zwolle put it:

"We want to be so sure that something is invested in a good way that we regulate everything ad nauseam. Everything is in planning, everything is in accountability. You can't really colour outside those lines because then you will be knocked back. I think we do need to loosen up but something else is needed for that first and that is namely a different mindset among people."

The province's spatial planning consultant also prefers to see the discourse in planning change first by simply arranging things more intelligently with each other; *"But if it turns out that we're all too stubborn for that anyway, then you'll just have to start arranging it legally. And that can simply be legally regulated by simply writing that down in a law, then it is regulated."*

When it comes to securing climate adaptation in laws and regulations, the energy transition is often cited as an example. Similarly by the province's spatial planning adviser: *"It is now simply stated in building decrees. That houses have to be energy-neutral. In that same building code, you could put that only wet feet should be allowed during rain showers that we expect once every 10,000 years or something like that."* But if, as a government, you really want to lay down something in a building code, this will also need to be accompanied by financial resources. The policy advisor climate adaptation of the ministry of infrastructure and water management also takes the legislation around energy as a starting point:

"I think that, just like in the energy transition, we have to be very clear about what is climate adaptive. We cannot say we are climate adaptive without clearly defining what climate adaptive is. As the government, we are now also working on a national ladder for climate adaptive building. So that we can draw more of a line in that as well. Whether that then actually becomes a law, or an advisory report, or ultimately an initial elaboration and then more building regulations, that all remains to be seen. We do work towards more clear frameworks."

Long run

Somewhere, the resistance also comes from the transition itself. The province's spatial planning adviser drew the parallel with warning a smoker about lung cancer. In this transition, too, it takes a long time before the negative consequences become visible, while intervention is already necessary in the short term:

"If we continue like this, it could be the case that our country is going to drown or that we are going to have hundreds of billions worth of damage in the economic heart of the Netherlands, but it is not like that yet. That's what makes this kind of slow changes like climate change tricky. It makes it difficult to put more pressure behind it. That context is complex but at the same time, I don't see it changing that fast yet."

The province's housing consultant, however, sees it as even more pessimistic: *"But anyway, you actually have to think about that now, while in practice we often only start doing that when it's too late because that's when the need is highest. That's quite a complicated split."* This may seem like a bit of pessimism, but it corresponds to what the province's climate adaptation programme manager quoted about laws and regulations: *"You also have to adapt laws and regulations at the moment the iron has to be forged. We could have done that ten years ago but we would never have succeeded. Not practically and process-wise. And so that is also now catching up where we are behind at the national and provincial level and now have a lot to do."* However, it seems that the window of opportunity is currently widening, after several periods of flooding in the region but also in the rest of the Netherlands, a series of extremely dry summers, and a positive changing discourse towards climate

adaptation. This accelerates the transition, believes the province's spatial planning adviser: *"Such transitions always require a long breath. Or an event, throw a pandemic on top of it and we really start working very differently. But to use pandemics and disasters for everything ... Major transitions are simply a long-term thing."* This last observation on the effect of shock events on land preparation is consistent with the findings of Raaijmakers et al (2018); the best way to get people to start preparing with flood risk management is through a flood event itself.

6. Conclusions

In this research, an attempt has been made to answer the following research question: *“How can new urban development contribute to more climate resilience for the region of Zwolle?”* To achieve this research to actually answer this question, a qualitative research has been conducted. An analysis on the current state of the climate risks, the urban ambitions when it comes to the realisation of more residential real estate, and how these two can be better aligned resulted in the following conclusions:

The climate risks that the region of Zwolle is facing are multiple and mainly dependant on the type of subsoil in which the particular part of the area is situated. However, all risks that are facing the Netherlands as a whole are represent in the region as well. When it comes to the city of Zwolle, the main challenge is pluvial flooding, the city is characterized as the drain of the region because of the different rivers and canals merging together in the city. These climate risks influenced the public discourse in a way that currently, the majority of all policy officers and governments feel the urge to intervene and prepare for the negative externalities that as a result of these climate risks. Which is in line with the expectations of Beck (1992), who predicts that as we move further into the transition towards a reflexive modernity, people will become increasingly aware and concerned with increasing risks. However, governments are facing more transitions and tasks than the one on climate adaptation and water safety. Issues as affordable and available housing, mobility, and nature are high on the political agenda as well. Some of these tasks are more characteristic for the first modernity. In the transition towards the second modernity, both issues occur alongside each other. On the one hand policy makers are more concerned about future risks while on the other hand, the political tension to fulfil peoples basic needs is still persistent (Beck, 1992).

In particular, the demand for more new-build housing and the political pressure to do so. The main concern is that the focus on climate adaptation and water safety is diminished by the focus on accelerated construction. On top of this, commodity prices and labour shortages are increasing in the sector. This makes it plausible to cut back on these facets. From the urbanisation strategy, however, there is an answer to this. The guiding paradigm should be that new inner-city developments should at all times contribute to improving the existing urban situation with a view to climate adaptation. On the one hand, the subsoil of the site and the existing water system should again become guiding factors in the function and design of the development. On the other hand, development should help reduce problems such as heat stress or pluvial flooding in the adjacent urban area. Herein, diversifying flood risk management strategies is increasingly central in order to create a healthier flood risk management in the urban environment (Kaufmann et al., 2016).

When it comes to diversifying various flood risk management strategies still a strong focus on traditional flood defence is shown. When it comes to risk-prevention, it becomes clear that site selection and proactive spatial planning is becoming increasingly relevant, especially on a regional scale. There is no far-reaching national policy to develop only in less flood prone locations, but choosing sufficient locations does play a role within the framework of the region. Mitigation is increasingly well established in new plans, this research cites several already developed plans that make intensive use of mitigation measures. On the field of preparation there is a large amount for improvement. Mainly on the field of creating awareness among citizens. As the Netherlands is characterized as a high impact- low probability case in the eyes of flood risk management, emphasises on flood recovery is not recommended. From Beck's risk society theory (1992), one would expect a larger focus on risk prevention as described by Kaufmann et al. (2016). Beck's assumption of increasing awareness of increasing risk is strongly reflected in the results. It just does not yet show itself in the implementation of flood risk management in the region. Perhaps also because of the path dependency created in the past by relying so heavily on flood defence and technological interventions.

So looking at the relationship between urbanisation and climate risks, there is still much progress to be made. This is partly due to the flaws in the system. The system that benefits from more integrated ways of working together is hampered by complexity and unclear ownership of problems, problems that according to Beck (1992) and Perrow (1994) by centralisation to avoid a state of organised irresponsibility. The problems arising now and in the long term in the area of water and climate do not have a clear actor as owner. That makes it hard to intervene in a collaborative integral way. When it comes to the involved actors and their roles, more guidance on water and climate seems to be needed. In this regard, there seems to be a clearer central role for central government as they have the ability to transcend regional disputes. In addition, the role of water authorities seems to be changing. As water becomes increasingly intertwined with spatial planning, water boards should also have a clearer role in this. However, it seems that water boards are not yet prepared for this.

Besides the need for some adjustments in the roles of actors at management level, several other aspects seem to impede the transition towards a more resilient region. First, the layers of government that should promote resilient spatial developments are often also responsible for other major transitions such as the mobility transition, energy transition, or solving the housing shortage. This is not about active opposition but about prioritising other tasks. This does lead to a kind of passive opposition. Existing interests such as those of the agricultural sector or landowners are cited as active opposition in the transition towards more inclusion of the subsoil and the water system. This makes it more difficult for local authorities to actually implement this transition. When it comes to current interests, it is actually mainly about (financial) resources. In this transition, it is the shortage of intellectual resources and shortages of personnel that complicate the transition. When it comes to ownership of current issues, standardisation, and regulation, these are actually one counteracting factor. The problem in this is namely that all these factors are set to the current and outdated system. There is a kind of prisoner's dilemma in which actors are not forward-thinking. This is consistent with the nature of transition. It is difficult to achieve such large transitions in a short time frame, even though it may be necessary to reduce future risks.

Summarising, the following answer can be posed to answer the main question of this study: First of all, integral collaboration in an early state between all actors involved, also the developers. And smarter designs of urban exploitations, which contains; A well-considered decision on flood risk management strategies focusing on the subsoil and the water system. Starting with choosing the best locations, and furthermore, covering other risks through other strategies such as food-defence and mitigation. To actually achieve this some additional interventions on management level are acquired. First, the national government has to take a more leading and central role to overcome regional disputes and to decouple the current system with a lack of ownership of the problem of climate adaptation. Besides that, the water authorities have to take a more prominent role when it comes to spatial planning that is more and more related to water management. To give a far-reaching and slow transition like this a good chance of success, it is important to tell the right narrative. A narrative that resonates with all actors and is told in the right 'language'. In this way existing interests and structures that are now impeding the demanded transition have to be replaced by an integral system of spatial planning and flood risk management that is able to increase resilience and liveability for the region.

Reflection

After the results have been interpreted and the conclusions have been conducted it is of importance to critically reflect on the way that this research has been conducted. Starting with the reliability of this research. Since there are so many actors involved in the problems that are formed by climate risks in combination with the desired urbanisation, a selection has been made to interview only experts in the field. Each involved actor has been represented by a respondent that participated in an interview.

This resulted in the situation that none of the layers of the multi-level governance structure has been missed. The risk here is that these actors are biased in a way because they also have to represent their own interests. However, this has been taken into account while conducting the interviews. Actually, this has been of significant importance for the research in a way. These biases are present in reality as well, where different actors also have to deal with the preoccupation of other actors.

As this research is based on qualitative methods with an explorative and inductive nature, the generalizability or external validity of this research is rather limited. However, the case of the region Zwolle has been referred to as the 'Netherlands in miniature' it should be premature to actually use this case to generalize the results for the rest of the country. However, it can be used as input or starting point for other regions since most regions are facing similar problems and contain similar structures of governing. Regarding the internal validity of this research a problem occurs. It cannot be said in advance that at every new moment in time this research can be fully reproduced. This is firstly because respondents' objective truths and recommendations were also included in the study because they were of significant importance to the results. However, that made the results difficult to reproduce. This may be as well due to the extent to which all other parameters can be equated to the conditions at the time of this study. *Ceteris paribus* is not easy to maintain within this type of study.

Nevertheless, the results of the research are actually in line with the expectations. There are no outliers were actually found in terms of respondents' answers that did not seem to match expectations. However, it should be added that some actors may have expressed themselves more politically correct during the interviews than they might have done without recording equipment. What was noticeable is that people often spoke more forthrightly after completing the interviews. However, no things were contradicted or nuanced or anything like that, which makes that the reliability of the data seems sufficient. What does form a limitation to the data is the actuality of the discussion, a lot of debate and public attention on the themes of this research could make the used data outdated. Many layers of government indicated that they are currently writing policies, which means that the data may not be completely up to date.

The theoretical framework used throughout this study was useful in most aspects. In particular, the practical approach of the star-flood model (Kaufmann et al., 2016) has served a useful function regarding water safety throughout the study. As an extended version of the multi-level safety concept (Stowa, 2014), the star-flood model is more focused on risk prevention, which fits well with the content of this study and case. Whereas the star-flood model mainly provided this practical approach, Beck's risk society theory (1992) was able to provide the scientific approach to risk. This theory is well reflected in the results and actually not refuted when it comes to the general assumptions on larger awareness and knowledge on risks. However, whether the reflexive modernity as described by Beck actually ever becomes reality has not been confirmed in this study. On the contrary, Beck describes current social system as in the transition towards a society in which risks will be the centre of society. A shift towards a system in which risk prevention will be leading is not expected to arise in the short term. Mainly because current system is still relying strongly on flood defence and technological interventions. So, no evidence was found for the actual future existence of a reflexive modernity. What is the case is that future risks are becoming increasingly relevant and respondents are increasingly aware of the possible negative externalities produced by first modernity. The policy arrangement theory (Arts and Van Tatenhove, 2004; Hajer, 1995; Liefferink, 2006) mainly served its function as a guiding structure during the interviews and analysis. However, as the research progressed, it proved that apart from this function, the theory did not fit the research as well as initially thought. This is why the input of this theory received less attention.

When it comes to the overall reliability of this study, it should be cited again that the human factor plays a clear role within this study. The fact that all the data was processed, analysed and interpreted by the researcher gives room for a certain bias. In this case, the client for this research is the province of Overijssel which means that the researcher may have had a slight bias. The selection of the respondents was done out of the network of Overijssel province which might have caused a bias. However, respondents who were not employed by the province were mainly approached. This can be seen in annex 3 where all respondents were carefully but anonymously categorised.

Further research

The advice for follow-up research is actually twofold. First, the results revealed the role of citizen awareness. This does not seem to be one of the variables that can be influenced when it comes to creating resilience. However, citizens are not included in the frameworks used, so the contribution of citizens to climate adaptation was omitted. Because this would be unsuitable for the way this research was conducted. Therefore, the first recommendation is to do follow-up research on how to increase the contribution of citizens in the region with regard to creating climate adaptation. This would perhaps rather benefit from a quantitative approach to get an accurate perception of what is actually going on among citizens in the region. However, this study seems to show that the role they could play is significant, since all respondents refuted the results of the study of Bradford et al. (2012). Secondly, a recommendation implied by one of the respondents. In this research, a single case study focusing on the whole region was chosen so that the governance issue could be prominently portrayed on a regional scale. The reason for this is that the subsoil and water system is regionally relevant as well. However, climate adaptation at the building level obviously also plays a role. An interesting recommendation for follow-up research therefore lies in comparing two corresponding cases where climate adaptation was and was not properly incorporated in the plan in question. The recommendation for this is therefore to conduct a qualitative study with two urban developments that both constitute a case. In this way, it is possible to investigate on a smaller scale what is needed to create more resilience and what is counterproductive.

7. Literature

Arts, B., Leroy, P., & van Tatenhove, J. (2004). Political Modernisation and Policy Arrangements: A Framework for Understanding Environmental Policy Change. *Public Organiz Rev*, 93-109. Dordrecht, The Netherlands: Springer Science + Business Media BV.

Arts, B., & Leroy, P. (2006). Institutional dynamics in environmental governance. ProQuest Ebook Central <https://ebookcentral-proquest-com.ru.idm.oclc.org>

Arts, B., van Tatenhove, J. (2004). Policy and power: A conceptual framework between the 'old' and 'new' policy idioms.

Bakker, M., Hegger, D., Driessen, P. (2016) A view on more resilient flood risk governance: key conclusions of the STAR-FLOOD project.

Beck, U. (1992) *Risk Society: Towards a New Modernity*. London: Sage.

Beck, U. 1998 'Politics of Risk Society', in J. Franklin (ed.) *The Politics of Risk Society*, Cambridge: Polity

Beck, U. 1999 *World Risk Society*, Malden, MA: Polity.

Bodemer, N., & Gaissmaier, W. (2015). Risk perception. In H. ChoT. Reimer, & K. McComas *The SAGE handbook of risk communication* (pp. 10-23). SAGE Publications, Inc., <https://dx.doi.org/10.4135/9781483387918.n5>

Boudia, S., & Jas, N. (2007). Introduction: risk and 'risk society' in historical perspective. *History and Technology*, 23(4), 317–331.

Comfort, L. K., Boin, A., & Demchak, C. C. (Eds.). (2010). *Designing resilience : Preparing for extreme events*. University of Pittsburgh Press.

Boister, N., Hekman, A., Swinkels, R., Wienhoven, M., Hek, M., Nilesen, A.L., ter Horst, W., van Alphen, J., (2021) *Het effect van klimaatverandering op de woningbouwopgave*

Buitelaar., E. (2019) *Versnelling van de woningbouw: van korte- naar langetermijnperspectief*.

Busscher, T, van den Brink, M, Verweij, S. (2019) Strategies for integrating water management and spatial planning: Organising for spatial quality in the Dutch "Room for the River" program. *J Flood Risk Management*.

CBS, PBL, RIVM, WUR (2020). Ruimtelijke ontwikkelingen in het rivierbed van grote rivieren geraadpleegd op 4-04-2022 via: [Ruimtelijke ontwikkelingen in het rivierbed van grote rivieren, 2000 - 2019](#)

Curran, D. (2016). *Risk, power, and inequality in the 21st century*. Palgrave Macmillan.

Deltares (2021) *Op water basis, de grenzen aan de maakbaarheid van ons water- en bodemsysteem*

Deltares (2021-b) *Nederland later II thema klimaatadaptatie*

Ekberg, M. (2007). The parameters of the risk society. *Current Sociology*, 55(3), 343–366.

ENW, 2019. Advies Houdbaarheid Nederlandse waterveiligheidsstrategieën bij versnelde zeespiegelstijging. Geraadpleegd op 28-11-2022 via: <https://www.enwinfo.nl/adviezen/advies-houdbaarheid-nederlandse/>

Fra Paleo, U. (Ed.). (2015). Risk governance : the articulation of hazard, politics and ecology. Springer. <https://doi-org.ru.idm.oclc.org/10.1007/978-94-017-9328-5>

Giddens, A. (1999). Risk and responsibility. *The Modern Law Review*, 62(1), 1–10.

Gemeente Zwolle (2021) Mijn Zwolle van morgen2030: Omgevingsvisie

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage

Hanseth, O. (2007) Complexity and risk. In *Risk, complexity and ICT* (pp. 75-93)

't Hart, H., Boeijs, H., Hox, J. (2005). *Onderzoeksmethoden*.

Hohenemser, C., R., Kates, W., & Slovic, P. (1985). A casual taxonomy. In R. W. Kates, C. Hohenemser, & J. X. Kasperson (Eds.), *Perilous progress: Managing the hazards of technology* (pp. 67–89)

Kaufmann, M., van Doorn-Hoekveld, W., Gilissen, H.-Kasper., & van Rijswijk, M. (2016). Analysing and evaluating flood risk governance in the Netherlands : drowning in safety? STAR-FLOOD Consortium.

Kaufmann, M. (2022) An European perspective on flood risk management [Powerpoint-slides] Management faculties, Radboud School of Management. Geraadpleegd op 22-3-22 van <https://brightspace.ru.nl/d2l/le/content/249560/viewContent/1531815/View>

Kearnes, M. (2008) Risk Society: Towards a new modernity by Ulrich Beck, *Geography*, 93:2, 122-123, DOI: 10.1080/00167487.2008.12094231

Keessen, A.M., Hamer, J.M., Rijswijk, H.F.M.W. van & Wiering, M.A. (2013). The Concept of Resilience from a Normative Perspective: Examples from Dutch Adaptation Strategies. *Ecology and Society*, 18(2). <https://www.ecologyandsociety.org/vol18/iss2/art45/>

Koop, S. H. A., Koetsier, L., Doornhof, A., Reinstra, O., Van Leeuwen, C. J., Brouwer, S. & Driessen, P. P. J. (2017). Assessing the governance capacity of cities to address challenges of water, waste, and climate change. *Water Resources Management*, 31(11), 3427-3443.

Liefferink, D. (2006). *The Dynamics of Policy Arrangements; Turning Round the Tethahedron*

Ministry of internal affairs (2020-a). *Staat van de Woningmarkt. Jaarrapportage 2020*. Den Haag: BZK.

Ministry of internal affairs (2022). *Ruimtelijke ordeningsbrief*

Ministry of VRO (2022) *Algemene beleidsbrief portefeuille Volkshuisvesting en Ruimtelijke Ordening*

OECD (2014) *Water Governance in the Netherlands – Fit for the Future?* OECD Studies on Water, OECD Publishing, Organization for Economic Cooperation and Development, Paris.

Pbl (2022) Correctie formulering over overstromingsrisico Nederland in IPCC-rapport. geraadpleegd op 8-1-2023 via <https://www.pbl.nl/correctie-formulering-over-overstromingsrisico>

- Perrow, C. (1999). Normal accidents : living with high-risk technologies (Ser. Princeton paperbacks). Princeton University Press.
- Pidgeon, N. (2011). Normal accidents reflections on disaster recovery. *Nature -London-*, 477(7365), 404–404.
- Pidgeon, N. F., Hood, C., Jones, D., Turner, B., & Gibson, R. (1992). Risk perception. In *Risk analysis, perception and management: Report of a Royal Society study group* (pp. 89–134). London, England: Royal Society.
- Primos (2021) Prognose van bevolking, huishoudens en woningbehoefte tot 2050.
- Provincie Overijssel (2022) Warme Harten in een Duurzame Delta
- Provincie Overijssel (2022-a) Klimaatadaptieve verstedelijkingsopgave regio Zwolle
- Punzo, G., Tewari, A., Butans, E., Vasile, M., Purvis, A., Mayfield, M., & Varga, L. (2020). Engineering resilient complex systems: the necessary shift toward complexity science. *Ieee Systems Journal*, 14(3). <https://doi.org/10.1109/JSYST.2019.2958829>
- Raaijmakers, R., Krywkow, J. R., and van der Veen, A. (2008) Flood risk perceptions and spatial multi-criteria analysis: An exploratory research for hazard mitigation, *Nat. Hazards*, 46, 307–322.
- Rijkswaterstaat (2006) Lessons learned from flood defence in the netherlands. *Irrigation and Drainage*, 55(S1), 132. <https://doi.org/10.1002/ird.242>
- Rijkswaterstaat (2019) Ruimte voor de rivieren geraadpleegd op 28-11-2022 via: <https://www.rijkswaterstaat.nl/nieuws/archief/2019/03/ruimte-voor-de-rivier-officieel-afgerond-winst-voor-hoogwaterveiligheid-en-landschap#:~:text=Donderdag%2014%20maart%202019%20wordt,hel%20project%20Ijsseldelta%20fase%201.>
- Rijkswaterstaat (2020) Ruimte voor de rivieren geraadpleegd op 28-11-2022 via: <https://www.rijkswaterstaat.nl/water/waterbeheer/bescherming-tegen-het-water/maatregelen-om-overstromingen-te-voorkomen/ruimte-voor-de-rivieren>
- Riley, J. R., and A. S. Masten. 2005. Resilience in context. In *Peters, Leadbeater, and McMahon 2005*, 13–25.
- Saunders, M. N. K., Thornhill, A., & Lewis, P. (2016). *Research methods for business students*.
- Scheepers, P., Tobi, H., & Boeijs, H. R. (Eds.). (2016). *Onderzoeksmethoden (Negende druk)*. Boom.
- Shrivastava, S., Sonpar, K., & Pazzaglia, F. (2009). Normal accident theory versus high reliability theory: a resolution and call for an open systems view of accidents. *Human Relations*, 62(9), 1357–1390.
- Sjöberg, L., Moen, B.-E., & Rundmo, T. (2004). Explaining risk perception: An evaluation of the psychometric paradigm in risk perception research. Trondheim, Norway: Rotunde.
- Stowa. (2014) Multi-level safety: water resilient urban and building design www.ateliergroenblauw.nl
- Sweco. (2021). De investeringsopgave in Deltaprogramma regio's.
- Sweco. (2021- a). Het effect van klimaatverandering op de woningbouwopgave

Sweco (2022) Klimaatadaptief ruimtelijk ontwikkelen Regio Zwolle, Uitgangspunten voor de verstedelijkingsopgave vanuit het bodem- en watersysteem en klimaatadaptatie.

Van Tatenhove, J.P.M., Leroy, P. (2003). Environment and Participation in a context of political modernisation. Verschuren, P., Doorewaard, H (2007). Het ontwerpen van een onderzoek.

Van Voorst, R. (2015): Applying the risk society thesis within the context of flood risk and poverty in Jakarta, Indonesia, Health, Risk & Society, DOI: 10.1080/13698575.2015.1071785

Vennix, J. (2010). Theorie en praktijk van empirisch onderzoek.

Wiering, M. (2019). Understanding Dutch Flood-Risk Management: Principles and Pitfalls. In: Isabelle La Jeunesse and Corinne Larrue (eds.) Facing Hydro-meteorological Extreme Events: A Governance Issue. Hoboken USA. John Wiley and Sons p. 115-124.

Wildavsky, A. (1988) Searching for safety. New Brunswick: Transaction
Wur (2020) Een natuurlijker toekomst voor Nederland in 2120

Yin, R. (2003). Case study research: Design and methods. London: Sage publications, Thousand Oaks, p19-56.

Annex 1. Interview Guide.

Geachte,

Op voorhand alvast hartelijk bedankt voor uw tijd. Mijn naam is Jesse Mangnus en voor mijn Masteropleiding; *'Environment and society studies'* ben ik op dit moment bezig met een afstudeeronderzoek naar waterveiligheid en klimaatadaptatie in nieuwbouwprojecten in de regio Zwolle. De aanname dat ook de regio Zwolle op te maken krijgt met de negatieve gevolgen van klimaatverandering wordt breed gedragen. Aangezien de woningopgave aanzienlijk is en eenvoudige uitbreidingslocaties ontbreken, ontstaat er een interessante uitdaging. De vraag reist namelijk hoe men kan voldoen aan de huidige en toekomstige woningvraag zonder daarbij eventuele *lock-ins* te veroorzaken. Hiermee wordt bedoeld dat keuzes die op korte termijn gunstig lijken, in de toekomst grote risico's of problemen met zich mee kunnen brengen. Deze keuzes kunnen op korte termijn maatschappelijke problemen als een woningnood oplossen, echter is het niet de bedoeling dat hierbij extra kosten of negatieve externe effecten worden afgewenteld op toekomstige generaties. Mijn hoofdvraag luidt dan ook als volgt; *"Hoe kan nieuwe woningbouw bijdragen aan meer klimaatbestendigheid voor de regio Zwolle?"* De aanname die centraal staat in dit onderzoek is dat wanneer we in staat zijn om op voorhand te anticiperen op de negatieve gevolgen die klimaatverandering, we hierdoor in de toekomst minder schade zullen ondervinden als het gevolg van overstromingen, wateroverlast, droogte et cetera.

In dit interview zal de nadruk liggen op vier verschillende dimensies die van belang zijn binnen dit vraagstuk; discourse, actoren, wet en regelgeving, en (financiële) middelen.

Voorafgaand aan het interview zou ik u graag willen vragen of u instemt met het opnemen van het interview, uiteraard zullen deze opnames alleen voor mijn onderzoek gebruikt worden? Informatie wordt uiteraard vertrouwelijk en anoniem verwerkt in het onderzoek. U zou me enorm helpen door in te stemmen met de opname.

Introducerende vragen

Kunt u kort u functie en de bijbehorende werkzaamheden toelichten?

Hoe ziet u de uitdagingen op de huizenmarkt van de regio Zwolle?

Vragen klimaatadaptatie

Hoe kijkt u naar de klimaatopgaven van de regio Zwolle?

Wat zijn hiervoor de meest voor de hand liggende oplossingen? Met name op het vlak van adaptatie?

Hoe staat dit in verhouding tot mitigatie?

Nederland staat vooral bekend om haar dijken en kustwerken, in hoeverre denkt u dat deze strategie afdoende is om toekomstige negatieve gevolgen van klimaatverandering te blijven opvangen?

Hoe kijkt u naar de rol van (proactieve) ruimtelijke ordening in het vraagstuk rondom klimaatadaptatie?

Hoe kijkt u naar de andere strategieën?(water opvangen, vlucht/evacuatie routes, compenseren/verzekeringen) Waar ligt ruimte voor verbetering?

Hoe kijkt u naar de complexiteit van het watersysteem in samenhang met klimaatverandering, er is veel onzekerheid over eventuele risico's en frequenties daarvan?

Discourse

Ervaart u dat er wat veranderd is in het debat rondom klimaatadaptatie? Bijvoorbeeld over de mate van maakbaarheid van gebieden, gebrek aan regie? Bredere maatschappelijke belangstelling?

Actoren

Hoe ziet u “*uw partij*” als actor in het vraagstuk rondom klimaatadaptatie

Wie draagt er de grootste verantwoordelijkheid voor het realiseren van voldoende woningen.

Welke actor is er verantwoordelijk voor het realiseren van klimaatadaptatie en resilience?

Welke actor is verantwoordelijk voor het minimaliseren van de negatieve gevolgen van klimaatverandering? Denk aan hogere piekafvoeren, overstromingen, dijkdoorbraken etc.

Welke actor is niet verantwoordelijk voor het garanderen van veiligheid in dit opzicht?

Zijn er actoren die de wending naar bodem en water sturend maken tegenwerken?

Zijn er actoren die een belangrijke coalitie vormen binnen het vraagstuk van klimaatadaptatie? Welke actoren verschillen specifiek van de opvattingen binnen deze coalitie?

Hoe kijkt u naar de manier waarop het we het systeem hebben vormgegeven op bestuurlijk niveau? Is hier ruimte om Complexiteit te verminderen?

(Financiële) Middelen

Worden alle financiële middelen op dit moment juist verdeeld tussen alle verantwoordelijke actoren? Zijn er actoren die eigenlijk meer financiële middelen beschikbaar moeten stellen?

Welke actoren komen middelen tekort? Denk aan kleine gemeenten die bijvoorbeeld specialistische kennis of mankracht missen?

Wet en regelgeving.

Hoe functioneert de wet en regelgeving rondom klimaatadaptatie op dit moment volgens u? Zijn er aanpassingen nodig als het gaat om wet en regelgeving?

Hoe zou het meenemen van klimaatadaptatie en waterveiligheid in nieuwbouw beter geborgd kunnen worden in wet en regelgeving?

Oplossingen

Hoe kijkt u naar technologische oplossingen als het gaat om het creëren van meer *resilience*? En hoe zit het met eventuele negatieve effecten van dergelijke technische oplossingen?

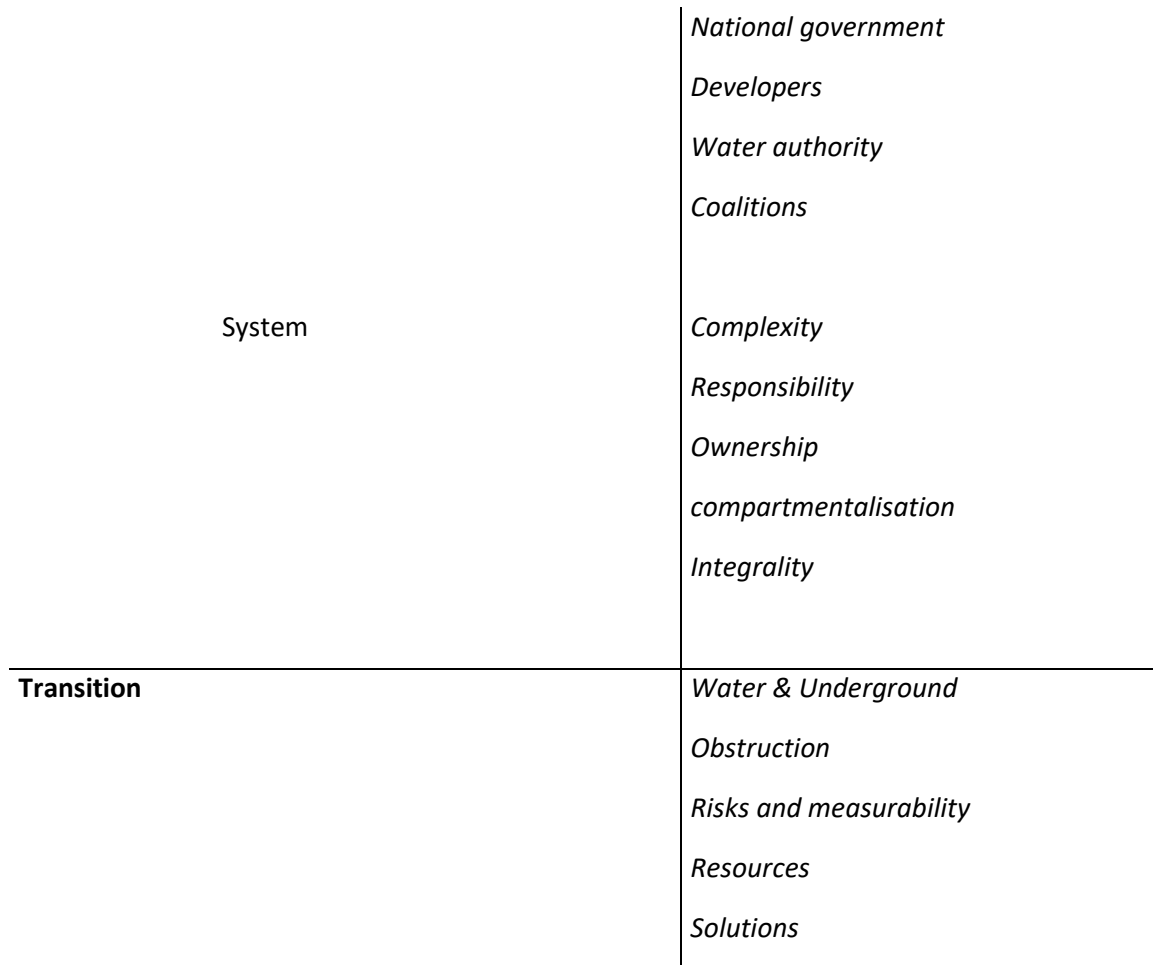
Ligt er een oplossing in het creëren van meer *awareness* onder de bevolking? Of werkt dit juist averechts?

Afsluitende vragen

Zijn er nog onbelichte zaken die niet aan bod geweest zijn maar wel van belang zijn voor dit onderzoek?

Annex 2. Coding scheme.

Group		Code
Climate	Discourse climate	<i>Discourse climate</i>
	Environmental challenges	<i>Existing real estate</i> <i>Environmental challenges</i> <i>Flooding</i> <i>Climate/Housing</i>
Urbanisation	Urbanisation	<i>Urbanisation</i> <i>Greenfield expansion</i> <i>Brownfield expansion</i> <i>FRM strategies</i> <i>Prioritization</i>
	Housing market	<i>Housing market</i> <i>Problems housing market</i> <i>Growth housing market</i> <i>Contraction housing market</i> <i>Acceleration</i> <i>Lifespan houses</i> <i>Climate/housing</i>
	Flood risk management strategies	<i>Flood risk management strategies</i>
Management	Management	<i>Management</i>
	Roles of actors	<i>Municipalities</i> <i>Province</i> <i>Region</i>



Annex 3. Respondents

	<i>Actor</i>	<i>Description</i>
1	<i>National government</i>	<i>Policy advisor housing and spatial planning at the ministry of spatial planning.</i>
2	<i>National government</i>	<i>Senior advisor climate adaptation at the ministry of infrastructure and water</i>
3	<i>Province</i>	<i>Strategic advisor spatial planning at the province of Overijssel</i>
4	<i>Province</i>	<i>Policy advisor housing and urban areas at Province Overijssel</i>
5	<i>Province</i>	<i>Programma manager klimaatadaptatie</i>
6	<i>Municipality of Zwolle</i>	<i>Advisor water and climate at the municipality of Zwolle.</i>
7	<i>Municipality of Zwolle</i>	<i>Planning officer at the municipality of Zwolle.</i>
8	<i>Municipality of Zwolle/Region</i>	<i>Process Manager Urbanisation Strategy</i>
9	<i>Region</i>	<i>Programme Manager Environment/ Planning officer</i>
10	<i>Water board</i>	<i>Strategic policy advisor water board</i>
11	<i>Developer</i>	<i>Project developer in the region Zwolle</i>