

(Un)paving the Way to Climate Adaptation

Engaging stakeholders in the implementation of local climate adaptation strategies in the Netherlands

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Abstract

The effects of climate change are becoming increasingly visible and will have detrimental impacts on society's health and safety, ecosystems and the economy, especially at the local scale. As a response, municipalities all over the world are setting up climate adaptation strategies, as is also the case in the Netherlands. However, many of the proposed measures require action not only on public but also on private land. Therefore, it is recognised that stakeholders play an important role in the creation of a climate-resilient society and should be engaged in several phases of the climate adaptation process. As literature on this topic is scarce, this thesis aims to better understand how this stakeholder engagement can take form. A case study of the municipality of Nieuwegein (the Netherlands) was conducted and barriers and drivers to take climate adaptive action for various stakeholders were identified through a content analysis of 14 interviews and three documents. This was done for the three phases of the adaptation process: understanding; planning; and managing. The results demonstrate that there are many interlinked barriers and drivers and that they vary depending on the seven identified stakeholder groups and the phases of the process. Subsequently, an adaptive governance framework was developed, where three main features were integrated: flexibility in the form of different governance modes; participation based on representativeness, communication and authority of participants; and learning as single-, double- and triple-loop learning throughout the process. With the help of the framework, the identified barriers and drivers were used to develop interventions points in each phase of the adaptation process for each stakeholder group. Although the results are context-specific, they show that by being aware of the needs of different stakeholder groups and understanding how adaptive governance can respond to that, local governments can find different ways to engage stakeholders to (un)pave the way to a climate-resilient society.

Keywords: climate adaptation; stakeholders; adaptive governance; participation; learning; flexibility

Executive Summary

The effects of climate change are becoming increasingly visible in large parts of the world. They manifest in the forms of changing precipitation patterns, droughts, heatwaves, flooding risks, air pollution and stronger hurricanes. All of these effects can have detrimental impacts on society's health and safety, ecosystems and the economy. Therefore, governments all around the world are starting to develop and implement climate adaptation strategies. Municipalities play a key role in the implementation of those strategies, as the effects and impacts are mainly felt on a local scale. However, many of the proposed solutions require action not only on public but also on private properties. Therefore, it is recognised that stakeholders, such as housing associations, companies, citizens, real estate developers and schools play an important role in the creation of a climate-resilient society. This is also reflected in literature, where many authors call for stakeholder engagement in several phases of the climate adaptation process.

Despite such calls for stakeholder engagement, setting up effective stakeholder participation remains a challenge. A first step in getting a better understanding of the role of stakeholders in climate adaptive practices could be to look at barriers and drivers for stakeholders to implement climate adaptive measures. Research on barriers and drivers has been conducted, but almost all studies focus on barriers, hardly ever on drivers, that exist within public authorities and leave stakeholders in other sectors out of the picture. Furthermore, such studies often come up with a list of barriers but rarely discuss why such barriers exist and how they can be overcome. By understanding how the barriers can be tackled and drivers can be used, municipalities and other stakeholders can act flexibly and holistically when integrating appropriate strategies and policies to adapt to the effects of climate change. In the Netherlands, where at least 50% of the land is privately owned, it is important to identify these barriers and drivers for stakeholders, as well as to find out how to proceed from there.

As such, the overarching **aim** of this thesis is to address these research gaps within the context of the Netherlands. This will lead to knowledge for practitioners on how to improve the engagement of stakeholders in the implementation of climate adaptation strategies, with the result to move towards a climate-resilient society. Guiding these aims, a research question (RQ) and two sub-research questions (SQs) have been formulated, as visualised in Figure 0-1.

RQ: How can stakeholders be encouraged to implement local climate adaptation strategies?

SQ1: What barriers and drivers exist for stakeholders to take climate adaptive measures?

SQ2: How can the barriers and drivers be used to enhance the implementation of climate adaptive measures?

Figure 0-1. Research questions

To find the answers to these questions, a **case study** was conducted of the municipality of Nieuwegein, an average-sized Dutch municipality located in the middle of the Netherlands. 14 semi-structured interviews were held with stakeholders from different sectors that have a large potential to implement climate adaptive measures. Among the interviewees were social housing associations, real estate developers and a school foundation. Furthermore, three documents containing relevant information about stakeholders were identified. The collected data were analysed through a content analysis.

The analysis followed the framework of Ekstrom and Moser (2010), categorising the adaptation process in three phases: understanding, planning and managing. The results regarding **SQ1** show that there are many interlinked barriers and drivers for stakeholders to take climate adaptive measures, categorised in political, informative, technical, resource-based, and social-cultural barriers and drivers (Thaler et al., 2019) (see Figure 0-2). However, whether these barriers and drivers are present is highly dependent on both the phase of the process as well as on the stakeholder group. Seven stakeholder groups were identified in Nieuwegein: social housing associations; citizens; real estate developers; commercial real estate owners; companies and business parks; schools; and governmental bodies. For example, the housing associations have no clear idea of where the problems are located and what their responsibilities are towards those problems, whereas for companies and business parks a bigger barrier is the lack of a network to collaborate on this topic. Citizens often do not even know what the term climate adaptation means, but they know about a liveable environment, while commercial real estate owners and real estate developers have likely developed Corporate Social Responsibility (CSR) strategies including goals on this topic. Real estate owners are looking for concrete requirements and integral plans, but for schools, this is not an issue at all, because they are not yet working on climate adaptation due to other priorities and financial constraints. Governmental bodies are looking for collaborations between their organisations, but this is still under development.

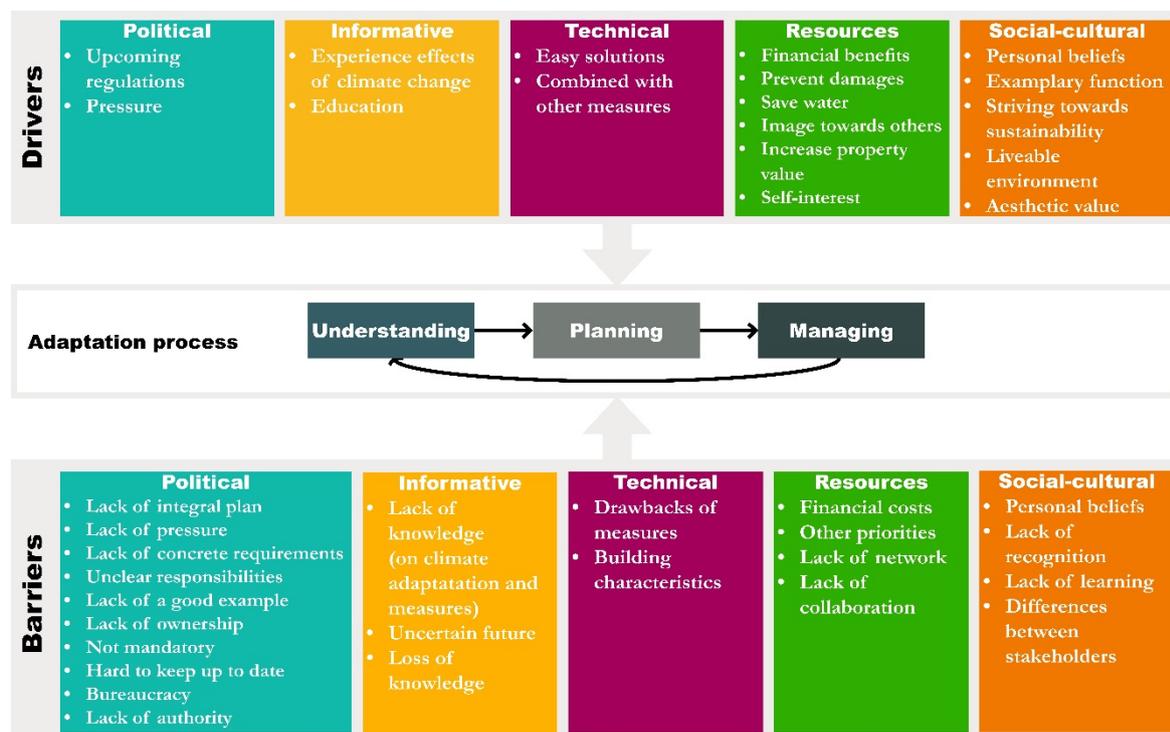


Figure 0-2. Barriers and drivers for stakeholders in Nieuwegein

Subsequently, an adaptive governance framework was developed to answer **SQ2**. Three main features of adaptive governance were integrated: flexibility in the form of achieving, legitimate, network and participatory governance modes (Bednar & Henstra, 2018; Steen et al., 2014); participation based on representativeness, communication and authority of participants (Fung, 2006); and learning as single-, double- and triple-loop learning throughout the process (Pahl-Wostl, 2009). See Figure 0-3 for a visualisation. This framework was used to develop intervention points in each phase of the adaptation process for each stakeholder group. These are targeted at the specific stakeholder groups and range from reaching out to schools and commercial real estate owners, who are currently not engaging with the municipality, to setting up park management on business parks. Also continuing with the inspiration sessions with the

social housing associations, which can be an example for other municipalities, and approaching climate adaptation more as a ‘liveable environment’ topic for citizens is recommended. For real estate developers, it is advised to come up with concrete requirements, from which they can choose the ones that apply to their specific project. However, due to the contextuality of the stakeholders and climate adaptation, a blueprint on how to apply adaptive governance to enhance the implementation of climate adaptive measures cannot be given. It is the mix of different governance approaches and participation methods combined with learning that will likely be most successful in overcoming or preventing barriers and optimising the use of drivers.

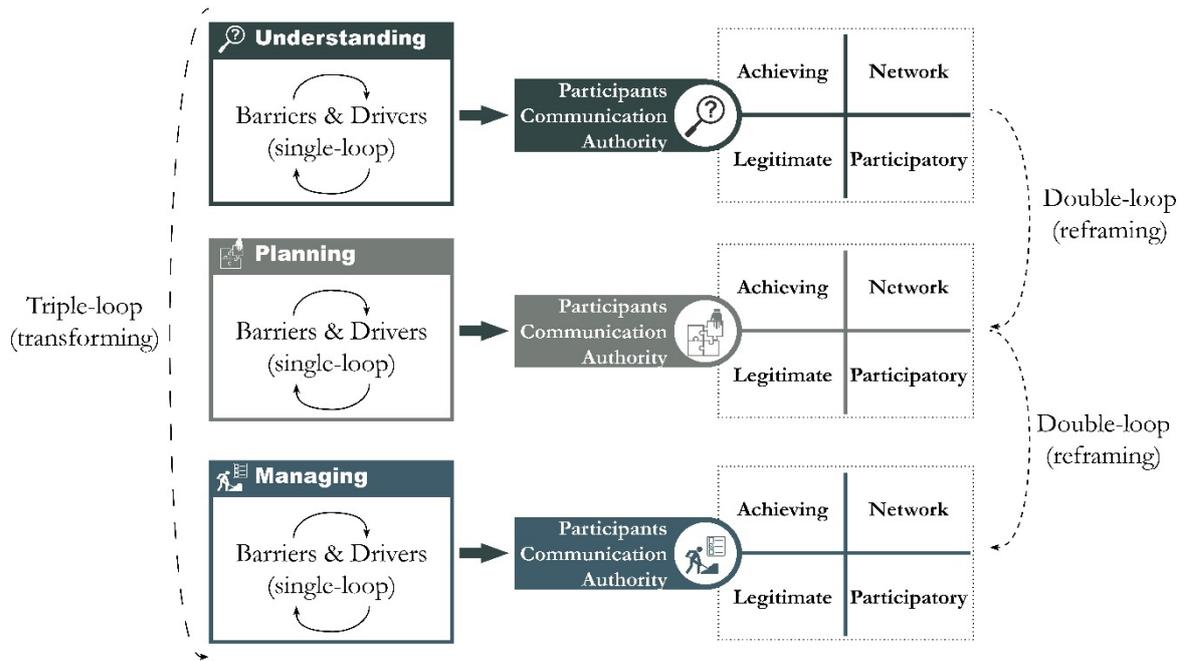


Figure 0-3. Adaptive governance framework for climate adaptation (own elaboration)

As a result, the answer to **RQ** delineates the importance to focus on the needs of the individual stakeholder groups. This includes the barriers and drivers as identified in the first sub-research question, but also the subsequent “road map” of the second sub-research question that lays out adaptive governance intervention points to overcome the barriers and optimise the use of the drivers. This combination is the way forward to encourage stakeholders to implement local climate adaptation strategies.

Various **recommendations to the municipality of Nieuwegein** are already embedded in the answer to SQ2. Furthermore, some **general recommendations** can be given to other practitioners, being other municipalities as well as intermediary organisations. First of all, it is important to identify who the stakeholders are in each context. The seven stakeholder groups that were identified in this research are likely to be present in every municipality, but the dynamics could be different and there could be additional stakeholder groups specific to a municipality. Secondly, once stakeholders have been identified, it is recommended to think in advance of what type of barriers and drivers the stakeholders are expected to have, where this thesis can serve as a reference point. By doing so, it is ensured that the design of the participatory process is adapted to its participants. Furthermore, the participatory process, for example in the form of risk dialogues, should also focus on the identification of the context-specific barriers and drivers for the individual stakeholder groups. This can, for example, be done by using speculative design methods. By identifying barriers early on in the process, they

cannot just be overcome, but potentially even be prevented or transformed into enablers for change.

To **conclude**, although the results of this study are context-specific, the identified barriers and drivers give an indication of what various stakeholders are experiencing. Furthermore, by making use of those barriers and drivers, it is explained how adaptive governance can tie into that. As such, this study showed that by being aware of the needs of different stakeholder groups and understanding how adaptive governance can respond to that, local governments can find different ways to engage stakeholders to (un)pave the way to a climate-resilient society.

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Abbreviations

CCAP – Climate Change Action Plans

COP – Convention of the Parties

CSR – Corporate Social Responsibility

DPRA – Delta Program Spatial Adaptation (Dutch: DeltaPlan Ruimtelijke Adaptatie)

ESG – Environmental, Social and Governance

EU – European Union

HDSR – Waterboard The Stichtse Rijnlanden (Dutch: Hoogheemraadschap De Stichtse Rijnlanden)

IPCC - Intergovernmental Panel on Climate Change

KNMI – National Meteorological Institute (Dutch: Koninklijk Nederlands Meteorologisch Instituut)

MLG – Multi-Level Governance

NAS – National Adaptation Strategy (Dutch: Nationale Adaptatie Strategie)

NBS – Nature-Based Solutions

NGO – Non-governmental organisation

NSOB – Dutch School for Public Administration (Dutch: Nederlandse School voor Openbaar Bestuur)

RQ – Research Question

SDN – Together Sustainable Nieuwegein (Dutch: Samen Duurzaam Nieuwegein)

SME – Small and Medium Enterprise

SQ – Sub-research Question

UHI – Urban Heat Island

UN – United Nations

UNFCCC – United Nations Framework Convention on Climate Change

VRU – Safety Region Utrecht (Dutch: Veiligheidsregio Utrecht)

1 Introduction

Providing space for stakeholders to engage in policy-making and policy implementation has become a widely recommended and sometimes even required practice (Uittenbroek et al., 2019). Bringing in a diversity of perspectives is expected to increase the quality of decisions, lead to solutions that are better adapted to the local context and stimulate social learning between different actors (Reed, 2008; Visser et al., 2019). Such benefits can be of great use in many different fields but are considered extremely relevant in the field of environmental policy, where complex and uncertain problems like climate change are discussed (Reed, 2008). Climate change is often tackled from a mitigation perspective, which has the goal to reduce greenhouse gases in the atmosphere and as such to ‘prevent’ climate change (IPCC, 2014). However, climate change is happening and its effects are already visible in large parts of the world. They manifest in the form of e.g. sea-level rise, droughts and heat waves, changes in precipitation patterns, extreme hurricanes, air pollution and floods (NASA’s Global Climate Change, n.d.). These effects can have detrimental impacts on society’s health and safety, ecosystems and the economy: heat waves and air pollution lead to increased deaths; droughts and extreme rainfall ruin crops and sometimes entire harvests; extreme hurricanes damage infrastructure and buildings; and sea-level rise can be fatal for people living in countries located below or around sea level (Stichting CAS, n.d.). Therefore, it is of high importance to not solely focus on mitigating climate change but also to expand practices to adapting society to climate change (NASA’s Global Climate Change, n.d.; Stichting CAS, n.d.).

Therefore, increasingly more governmental bodies are setting up climate adaptation policies to make society more resilient to climate change (IPCC, 2014). Although climate change is a global problem, the impacts are mainly felt on a local scale (NASA’s Global Climate Change, n.d.) and therefore local authorities, such as municipalities, are often responsible for developing concrete measures and implementing them (Bauer & Steurer, 2014). Such measures can for example stimulate the creation of green or blue spaces on roofs, gardens and parking lots as they lower temperatures, filter air, and work like sponges to store and release water when needed. Also, dedicated spaces, such as retention ponds, semi-permeable pavements on roads and sustainable urban drainage systems can be created to store water in case of heavy rain or flooding. Furthermore, strategic decisions can be made to place vital infrastructure, such as electricity or drinking water stations, on higher places so they will not be affected in case of a flood.

However, many of these measures require action not only on public but also on private properties (Mees, 2017). Therefore, it is recognised that stakeholders, such as housing associations, companies, citizens, real estate developers and schools play an important role in creating a climate-resilient society (Gardner et al., 2009). This is also reflected in literature, where the Intergovernmental Panel on Climate Change (IPCC) and many authors call for stakeholder engagement¹ in several stages of the decision-making process and implementation of climate adaptation policies (IPCC, 2014; Uittenbroek et al., 2019).

1.1 Problem Definition

Despite such calls for and the claimed benefits of stakeholder engagement, setting up effective stakeholder participation remains a challenge (Eriksson et al., 2015) and best practices in stakeholder participation remain unclear. Jager et al. (2020) tried to address this by quantitatively analysing a large number of participatory processes as well as the respective environmental output, acceptance and implementation. Based on their results, they call for further qualitative

¹ The terms stakeholder engagement, stakeholder involvement and stakeholder participation will be used intertwined in this thesis.

research that provides “*better explanations for on the ground implementation of and compliance with agreed outputs, and the role of participatory and collaborative governance processes therein*” (Jager et al., 2020, p. 397).

Explanations for the implementation, translated into barriers (and rarely in drivers), have been discussed in the field of climate adaptation by authors from various disciplines, such as public administration, geography, psychology, sociology and political science (Biesbroek et al., 2013). However, literature is fragmented across academia and often the results are context-specific (Biesbroek et al., 2013). Moreover, almost all studies focus on barriers that exist within public authorities (on different levels) and leave stakeholders in other sectors, including infrastructure, biodiversity and engineering, out of the picture (Biesbroek et al., 2013). This is surprising since actor-related barriers have a relatively high influence on the uptake of climate adaptive measures (Ekstrom & Moser, 2014). Lastly, such studies often come up with a list of barriers, but hardly ever discuss why such barriers exist and how they can be overcome (Biesbroek et al., 2013). For example, although a recently published report on climate adaptation in the Netherlands explains barriers for municipalities, they do not mention stakeholder-related barriers or strategies on how these barriers can be prevented or overcome (van Bijsterveldt et al., 2021). With more stakeholders included in the adaptation process, it is necessary to understand whether new types of barriers appear and how the dynamics between the barriers change (Ekstrom & Moser, 2014). Furthermore, the lack of addressing the barriers is particularly problematic, as it is the key to “*achieving more systematic adaptation that is not just focused on projects but on an institutional environment*” (Ziervogel & Parnell, 2014, p. 57). By understanding how the barriers can be tackled, municipalities, as well as other stakeholders, can act flexibly and holistically when integrating appropriate strategies and policies to adapt to the effects of climate change (Ziervogel & Parnell, 2014). Although drivers have hardly been discussed in the field of climate adaptation, they can facilitate this process and should therefore also be included in an explanation for the implementation.

The involvement of stakeholders in adapting to climate change is necessary since adaptation is highly contextualised and requires solutions in both public and private properties (Gardner et al., 2009; Mees, 2017). Especially in the Netherlands where at least 50% of the land is privately owned, it is important that stakeholders accept and implement the developed adaptation strategies (van Veen & Boerbooms, 2019). Furthermore, the Netherlands is characterised by a ‘Participatory Society’ (*‘participatiesamenleving’* in Dutch), where non-state actors are expected to engage and take responsibilities in public matters such as climate adaptation (Uittenbroek et al., 2019). Because of these aspects, local governments, who are encouraged by national policies to develop climate adaptation strategies, set up stakeholder dialogues as part of that process. As a result, these adaptation strategies strongly rely on the engagement of stakeholders in the implementation (Stichting CAS, n.d.).

1.2 Aim and Research Questions

The overarching aim of this thesis is to address the research gaps regarding the barriers and drivers for stakeholders to implement climate adaptation strategies as well as how to proceed from there. By doing so, knowledge for practitioners will be created on how to improve the engagement of stakeholders in the implementation of climate adaptation strategies, which is needed to move towards a climate-resilient Netherlands. Furthermore, this thesis contributes to literature on barriers and drivers to implementation for stakeholders as well as adaptive governance, which is used as a framework to analyse the results. At the same time, new research gaps in these fields that can be addressed by academic researchers in future works are identified. Together, these aims have led to the following research question (RQ):

RQ: How can stakeholders be encouraged to implement local climate adaptation strategies?

To answer this research question, this thesis looks into the barriers and drivers that exist for different stakeholders to take climate adaptive measures. By doing so, this thesis aims to understand why stakeholders are or are not taking climate adaptive measures. Furthermore, interventions to overcome the barriers and optimise the use of the drivers are developed. This has the aim to bring stakeholders as well as municipalities a step further in their work on climate adaptation. Two sub-research questions (SQs) have been formulated to guide these aims:

SQ1: What barriers and drivers exist for stakeholders to take climate adaptive measures?

SQ2: How can the barriers and drivers be used to enhance the implementation of climate adaptive measures?

1.3 Scope and Delimitations

This thesis focuses on stakeholder engagement in developing and implementing climate adaptation strategies in the Netherlands. Several reasons exist for the choice of this country. First of all, in the Netherlands, the national policy requires municipalities to set up climate adaptation strategies and encourages them to engage stakeholders in the process of doing so. Secondly, this thesis is conducted in collaboration with TAUW, a European consultancy company with several offices in the Netherlands. From the Dutch offices, the climate adaptation team supports various municipalities in the Netherlands in the development of climate adaptation strategies. Organising stakeholder participation is part of this process. Many insights on the Netherlands were gathered because of this collaboration and through the network of TAUW data was easily available. Lastly, the researcher speaks Dutch, which seemed important for understanding policies and conducting interviews.

To make this thesis both doable and valuable within the set time frame, it was chosen to focus on one municipality in the Netherlands. The main reason for focussing on this local level is because that is where the impacts of climate change are most visible and felt (NASA's Global Climate Change, n.d.). Within this municipality, the aim was to talk to a wide variety of stakeholders to understand different viewpoints on climate adaptation. The stakeholders were carefully chosen, but it must be recognised that a) not all relevant stakeholders were interviewed and b) from certain sectors only one stakeholder was interviewed, which might skew the results. Moreover, it is acknowledged that each context is different, meaning that the conclusions of this thesis are not a blueprint for engaging stakeholders in climate adaptation. Rather, they function as guidelines that have to be taken into account when developing and implementing climate adaptation strategies with stakeholders.

1.4 Ethical Considerations

This research was conducted in collaboration with TAUW, specifically with the climate adaptation team, for which the researcher received financial compensation. This compensation has not in any way negatively influenced the results of this thesis. Contrary, the collaboration helped the researcher to write a better thesis by having one foot in real-life practices and one foot in academic research. When reaching out to participants for the survey and interviews, this collaboration was always mentioned.

For the survey that was conducted as part of this thesis, conditions were listed at the beginning of the survey as well as in the email that accompanied the survey. Respondents agreed to these conditions by filling out the survey. Important to note is that anonymity was not guaranteed as the researcher needed to know what municipality filled in certain answers.

Before the interviews took place a consent form was sent out to the participants. This consent form was based on Dunn (2016) and laid out the rights of the participants and asked them for permission to record the interview. The recordings, as well as all the other material of this thesis, were stored on a computer that was connected to the researcher's account on Microsoft One Drive. Furthermore, before the interview, an introduction to the research was given and the goals of the interview were mentioned.

1.5 Audience

There are several audiences of this thesis. First of all, as the thesis is written in collaboration with TAUW, the research is intended to be useful for them. They can use insights from the municipality of Nieuwegein to improve their support to other municipalities that are working on climate adaptation and stakeholder engagement. Next to TAUW, other intermediary organisations can learn from this research. Furthermore, as this work focuses on the municipality of Nieuwegein, the results can be useful for them to enhance their work on climate adaptation. However, climate adaptation is not limited to this municipality and also other municipalities are working on this topic. Therefore, the results could be valuable to other local governments at various stages in the process, within the Netherlands, but potentially also in other parts of Europe. Lastly, this thesis aims to bring a meaningful contribution to academia, by addressing the abovementioned research gaps and identifying areas for further research.

1.6 Disposition

Chapter 1 introduces the topic, research gaps and subsequent research questions. It also provides the aim of the study, as well as the scope and intended audience. *Chapter 2* presents existing literature on climate adaptation, stakeholder engagement, governance approaches and barriers to implementation. *Chapter 3* presents the theoretical framework that is used to analyse the results. This framework is based on adaptive governance literature and consists of three main elements: flexibility, participation and learning. *Chapter 4* introduces the research design, including methods for data collection and analysis. *Chapter 5* presents a background section on the Netherlands. It discusses the broader context of climate adaptation in the Netherlands, as well as national policies. Furthermore, it gives background information on the case study, being the municipality of Nieuwegein. *Chapter 6* provides the findings of this research, which are analysed with the adaptive governance framework. *Chapter 7* discusses the findings based on interesting topics that emerged during the research and existing literature. Furthermore, recommendations are given to the municipality of Nieuwegein and other practitioners. Also, the academic contribution and limitations of the study are discussed. *Chapter 8* presents the answers to the research questions and a conclusion of the whole research.

2 Literature Review

This chapter presents a thorough review of academic literature on climate adaptation and the role of stakeholders therein. *Section 2.1* starts with explaining how climate adaptation is approached, which stakeholders play a role and how governance fits into this. In *section 2.2* the benefits and limitations of stakeholder participation are presented. This is followed by *section 2.3* where implementation in real-life practices and barriers to implementation of climate adaptive measures are presented. Lastly, in *section 2.4* a summary of the literature review is given.

2.1 Climate Adaptation

In tackling climate change two main approaches can be distinguished: climate mitigation and climate adaptation. The first approach focuses on tackling climate change, by lowering the levels of greenhouse gases in the atmosphere, whereas the second approach focuses on adapting social-ecological systems to the climate change that is already happening or foreseen to be happening (IPCC, 2014). These social-ecological systems are system integrations of humans and the environment (Berkes & Turner, 2006), such as the built environment (Moffatt & Kohler, 2008) or agriculture. For many years, mitigation was the leading approach to address climate change according to many important organisations, such as the United Nations (UN), with the idea that it is better to avoid than to cure (Grafakos et al., 2019). As a result, mitigation actions received almost all attention in Climate Change Action Plans (CCAP) and funding from international multilateral development organisations and banks (Grafakos et al., 2019).

However, the effects of climate change are becoming more visible in large parts of the world. They manifest in the forms of changes in precipitation patterns, droughts, heatwaves, flooding risks, air pollution and stronger hurricanes. All of these can have detrimental effects on human health and safety, ecosystems and the economy. As a result, it has been acknowledged that also adaptation measures need attention and funding. The Convention of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) in Marrakesh in 2003 was the first time that adaptation was put higher on the agenda and in 2021 the first-ever Climate Adaptation Summit was held (aan de Brugh, 2021). In academic literature, climate adaptation has also received increasingly more attention. Different types and approaches to climate adaptation are discussed by scholars from various disciplines, such as environmental management, biology, geography and development studies.

Three different types of responses to the effects of climate change can be distinguished: coping; incremental adaptation; and transformative adaptation (Fedele et al., 2019). See Figure 2-1 for a visualisation. Coping is a response used to reduce the impacts of climate change, but it does not change the existing social-ecological system (Fedele et al., 2019). This strategy is often reactive and used when the impacts are not extreme, when the need to change is not recognised or when there is not sufficient technical or financial capacity to act in a different way (Fedele et al., 2019). An example of a coping response is installing blinds to keep the heat out of the house during hot days. The second response is incremental adaptation, which creates small changes to the existing social-ecological system and focuses on building resilience (Fedele et al., 2019). This strategy is often more anticipatory, meaning that adaptive measures are implemented before the impacts of climate change are experienced. Examples are increasing the capacity of the sewage system or building irrigation for agricultural fields. However, these solutions have a chance to be maladaptive, because the *“effects of long-term environmental change are marginalised and the interactions between decision lifetimes, uncertainties about the nature of biophysical change and possible adaptation options tend to be downplayed”* (Colloff et al., 2017, p. 88). Therefore, scholars call for transformative adaptation, which aims to tackle the root cause of the vulnerability of the social-ecological system (Fedele et al., 2019). Fundamental long term changes in the system are needed to achieve this type of adaptation, where the effectiveness of the existing system is questioned, and other

issues such as social injustice can be integrated as well (Lonsdale et al., 2015). Examples are the use of restoration of landscapes, the creation of tidal parks and shared gardens. They often come in the form of Nature-Based Solutions (NBS), which are “solutions that are inspired and supported by nature, which ... provide environmental, social and economic benefits and help build resilience” (European Commission, n.d.).

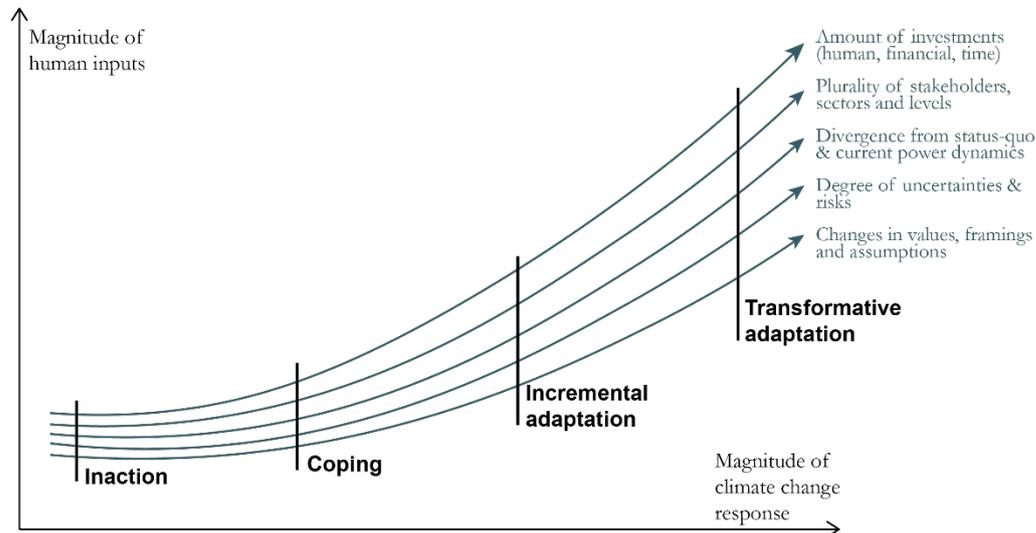


Figure 2-1. Different types of adaptation, adapted from Fedele et al. (2018)

The way such adaptive responses are integrated into policy differs between two approaches. A new policy domain can be set up for climate adaptation, which has the main objective of becoming climate-resilient (Uittenbroek et al., 2013). This approach is called the dedicated approach (Reckien et al., 2019). Climate adaptation can also be integrated into already existing policy domains, called adaptation mainstreaming (Uittenbroek et al., 2013). Although many scholars argue for this second approach, as it creates possibilities for innovation and it enhances the effectiveness and efficiency of policies (Uittenbroek et al., 2013), currently adaptation mainstreaming is not commonly adopted, and most cities write dedicated climate adaptation plans (Reckien et al., 2019). This might be because the dedicated approach implies direct political commitment, resource allocation and clear policy objectives, which is supposed to lead to fast implementation (Uittenbroek et al., 2013). Because of the value of both approaches, Reckien et al. (2019) argue for a “dual track approach”: either a dedicated adaptation plan is developed at the same as a mainstreaming plan, or first a dedicated plan is developed followed by a mainstreaming plan (Reckien et al., 2019). By doing so, the advantages of both approaches are utilised.

2.1.1 Multi-Level Governance

Dedicated, mainstreaming or “dual track” strategies and agendas covering climate adaptation are becoming more common (Grafakos et al., 2019), with public authorities across the entire world starting to develop and implement them (IPCC, 2014). Often the concept of strategy, plan and agenda are used interchangeably when talking about climate action (Baker et al., 2012). However, a strategy is a route or a vision to get to specific goals, whereas a plan or agenda is much more concrete: it presents an approach or tools to achieve the goals set in the strategy (Baker et al., 2012). When setting up strategies and/or agendas for climate adaptation, public authorities can make use of the model of Multi-Level Governance (MLG). In this model, power relations are described on a vertical dimension across different governmental levels (neighbourhood, municipal, regional, national, continental and global) and on a horizontal

dimension across governmental and non-governmental actors (public authorities, local communities and private entities) (Bache & Flinders, 2004). Figure 2-2 visualises MLG, with the dimensional focus of this thesis highlighted in colour.

On a vertical dimension, multiple levels of government are involved. Here, two distinct roles can be identified. On the one side, national and supranational levels raise awareness, provide frameworks and guidance and grant funding for adaptation projects (Bauer & Steurer, 2014). On the other side, local authorities play a key role in the planning and implementation of climate adaptation strategies, as also advocated by the IPCC (Bauer & Steurer, 2014; IPCC, 2014). Regions and provinces are expected to mediate between the different governmental levels (Bauer & Steurer, 2014). This type of interaction on the vertical dimension can help to avoid key barriers to climate adaptation (Yusuf et al., 2016).

On a horizontal dimension, non-governmental actors are involved in governance practices (Keskitalo, 2010). These non-governmental actors can be called stakeholders: organised groups of people who have something at stake in a specific decision – they can influence or are influenced by the decision (Luyet et al., 2012; Reed, 2008). The type of stakeholder depends on the context and can vary a lot (Glicken, 2000), from citizens to real estate developers to social housing associations. Because of the contextuality of climate adaptation, the IPCC and many authors call for stakeholder engagement in several stages of climate adaptation (IPCC, 2014; Uittenbroek et al., 2019).

Global level			
Continental/EU level			
National level			
Regional level			
Municipal level			
Neighbourhood level			
	Public authorities	Local communities	Private entities

Figure 2-2. Multi-level governance, adapted from Jänicke (2017)

2.1.2 Stakeholders

One of the first questions related to stakeholder engagement considers which stakeholders to engage. Identifying the right stakeholders is an important task because it determines the success of the participation (Uittenbroek et al., 2019). It is also a complicated task since ‘stakeholder’ is a relative term: stakeholders only become stakeholders “in reference to a particular issue” (Glicken, 2000, p. 307). This means that depending on the issue, which is time and site-specific, stakeholders can differ. As such, no universal list of stakeholders for climate adaptation can be given. However, often three categories of stakeholders are listed, as was also seen in the horizontal dimension of MLG (Gardner et al., 2009; Jänicke, 2017; Reckien et al., 2014):

- Public authorities, including local, regional, national, supranational bodies, as well as infrastructure bodies, such as water boards.

- Local communities, including NGOs, citizens and other types of associations, such as ones responsible for social housing and the built environment.
- Private entities, including companies and intermediary organisations, such as consultants and boundary organisations.

Public authorities

A traditional belief has been that the public domain is responsible for public concerns and that the private domain, including private entities and local communities, is responsible for private concerns. Around the 1980s this perspective changed, and the responsibility of public concerns started to move to the private domain, resulting in a “*shift from government to governance*” (Mees, 2017, p. 375). The idea of governance remains blurry, as there are many different definitions. However, most refer to the creation of governing modes in which the boundaries between the private and public domain have softened. As such, the role of the government moved from a rowing position to a steering position. (Mees, 2017)

This shift can also be seen when it comes to governing climate adaptation. Local governments often initiate and design climate adaptation policies, but the implementation is partially delegated to non-state actors, such as citizens or housing associations (Mees, 2017). Public actors currently remain “...*in the driving seat in the governance of adaptation to climate change*” (Mees, 2017, p. 385), but this might change due to the increasingly recognised need for adaptive measures in the private sphere and new explorations of divisions of responsibility. Alternatives would be to hand out more responsibilities to non-state actors or to enhance public-private collaborations (Mees, 2017).

Local communities

Most literature on participation focuses on citizen participation. The rights of citizens to engage in decision-making processes that affect them is increasingly seen as a democratic right. As such, it is written down in for example the United Nations Economic Commission for Europe’s 1998 Aarhus Convention (UNECE, 2021) and the United Nations Economic Commission for Latin America and the Caribbean 2018 Escazú agreement, that was recently entered into force (ECLAC, 2021). However, the actual role citizens play in environmental matters that concern them depends on the willingness of the citizens (Uittenbroek et al., 2019) and the stage of the policy process. For example, it is quite rare that local communities are involved in the planning stage of climate adaptation policies (Mees, 2017).

Hegger et al. (2017) conducted a study in the Netherlands to find out what roles citizens have in climate adaptation. They differentiated three different roles of citizens: as citizens following laws and policies; as consumers in the market; and as members of civil society. Furthermore, they distinguished between mainstream and additional roles. They found that the mainstream roles for citizens in all three positions are currently limited and passive, such as receiving information on vulnerabilities. Additional roles show that in specific cases there is potential for active roles for residents. For example, residents can receive formal responsibilities and can be encouraged to take measures on their property, such as the implementation of green roofs or solutions to retain rainwater. A shift to embed additional roles in mainstream roles requires a change in mindset and concrete action, at both the private and public level. (Hegger et al., 2017)

Next to citizens, non-governmental organisations (NGOs) are also part of local communities, as they often represent a group that is not able to represent themselves, such as the environment. To determine their role, NGOs have the choice between two types of strategies: insider strategies, where they are in close contact with the decision-makers and aim to directly influence the decision-making; or outsider strategies, where they aim to impact the decision-making from

the outside by putting public pressure on the decision-makers. This second strategy is carried out by strategically making use of (social) media, organising protests and campaigning. Furthermore, a third type of role can be identified for NGOs, which is lobbying. This semi-outsider strategy guarantees (partial) access to the negotiations, but often they are not seen as a trusted member due to their beliefs. (Rietig, 2011) Furthermore, NGOs are engaged in the implementation of the decisions that were taken, where they have taken on important roles in delivering environmental services, such as tree-planting actions, in several cities across the world (Foo, 2018).

Private entities

There are limited studies on the role companies can and want to play in climate adaptation, as traditionally most discussions and research in the business field are focused on mitigation practices (Linnenluecke et al., 2013). However, businesses are often equipped with financial resources, technological expertise and organisational flexibility (Linnenluecke et al., 2013) and could therefore play a pivotal role in adaptation practices as well (Leitold et al., 2020). Shared responsibility with these stakeholders has been emphasised in literature (Mees, 2017), but the engagement of especially local Small and Medium Enterprises (SMEs) in adaptation strategies remains limited (Leitold et al., 2020). This could be due to a lack of consideration for SMEs from public authorities or to a lack of willingness to participate from SMEs (Leitold et al., 2020).

Next to companies, consultants are becoming increasingly more important in climate adaptation practices, with public authorities in many countries turning to (private) consultants as “...an efficient source of credible, independent and contextualised adaptation knowledge and advice” (Keele, 2017, p. 18). These private-sector experts are deeply embedded in adaptation governance resulting in new divisions of authority and responsibility. (Keele, 2017)

2.1.3 Governance

How these three groups of stakeholders interact with each other, depends on the type of governance. Much has been written on different governance types, but limited research exists on governance types applied to the field of climate adaptation (Bednar & Henstra, 2018). Bednar and Henstra (2018) describe four widely known modes of governance as ideal modes for climate adaptation. Below these modes are explained.

The first typology of governance is **hierarchical governance**. In this mode, authority is dispersed from top to bottom and determined by the place in the hierarchy. Non-state actors might provide information, but there is not much room for an in-depth form of stakeholder engagement. Regulatory policy instruments, such as laws, permits and regulations are most common. Although this hierarchical structure is inflexible, it can be very useful to command the behaviour of society, for example requiring real estate developers to store a certain amount of water in a newly built building.

The second typology is **market governance**, where authority is divided between all individuals that conduct transactions and participate in the market. The government is seen as a company, and citizens and other stakeholders are its clients. Market competition and negotiations determine the position of the public authority, who can have different roles such as a rule-maker, observer or participant. Policy instruments that are used in this type of governance are related to supply and demand or economic instruments, such as taxes or subsidies. For climate adaptation, this could be in the form of a subsidy for green roofs for example. A strength of this type of governance is that it is quite reflexive and enables all participants to influence policy decisions by their actions in the marketplace. However, a big limitation lies in the risk of market failures.

Thirdly, there is **network governance**, which builds on principles of trust and cooperation. There is increased room for stakeholder engagement and authority is divided in a horizontal way that creates the most benefit for all stakeholders. Public authorities are just one of the many actors, however, they keep the authority and legitimacy to choose the rules of the network. However, the extent to which public authorities can do that depends on the form of the network. Typical policy instruments are negotiated agreements, covenants, codes of practice or public-private partnership. Examples are regional or local networks for climate adaptation, where partnerships can be built and best practices can be shared. A drawback of this type of governance is that networks can be unrepresentative and dependent on the willingness of the stakeholders. Nonetheless, network governance has been embraced to address wicked problems such as climate adaptation.

Lastly, a typology of **community governance** has been described. This mode is in a way similar to network governance, as it embraces the same ideals of consensus and participation. However, steering stays at the local level and the role of public authorities is facilitator and stimulator, in a limited way. Common policy instruments for community governance are self-regulation and voluntary participation, such as a community initiative to create shared gardens in the street. A major strength of this mode is that it is expected to create solutions that fit the local context and problematic policies developed at higher levels are avoided. However, it is also said that community governance is not realistic and, similar to network governance, may be unrepresentative.

In each of the governance modes, different participatory techniques can be used. Table 2-1 gives an overview of these techniques per governance mode. Note that participatory techniques are by far not limited to the list provided in Table 2-1 and that this classification per governance mode can change based on the context of where the technique is used in practice.

Participation technique	Legitimate governance	Market governance	Network governance	Community governance
Newsletters	X			
Reports	X	X		
Presentations, public hearings	X	X	X	
Internet webpages	X	X		
Interviews, questionnaires and surveys	X	X	X	
Field visit and interactions			X	X
Workshops			X	X
Participatory mappings			X	X
Focus groups			X	X
Citizen juries	X			
Geospatial/decision support systems	X	X	X	
Cognitive maps			X	
Role playing			X	X
Multi-criteria analysis			X	
Scenario Analysis			X	X

Consensus conferences			X	X
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Table 2-1 Participatory techniques in different governance modes, adapted from Luyet et al. (2012)

2.2 Stakeholder Engagement

As explained by Table 2-1, different forms of participation exist within the different governance modes. However, despite widespread acceptance of and calls for stakeholder engagement, many different definitions of stakeholder engagement exist (Luyet et al., 2012). This is probably due to the variety of disciplines, such as public administration, urban planning, environmental management and social sciences, where this topic is of importance. Reed (2008) defines participation as “a process where individuals, groups and organisations choose to take an active role in making decisions that affect them” (p.2418). Gardner et al. (2009) also talk about a decision but do not explicitly mention that stakeholders will be making that decision. Rather, stakeholders are directed “in some form of collaborative effort” towards a decision and this decision “might involve future planning and/or behaviour change” (p.11). This collaboration can take many different forms, from brief information provision to more in-depth and long-term relationships between the stakeholders (Gardner et al., 2009). Luyet et al. (2012) adapt the definition of the World Bank and see stakeholder participation as the “process through which stakeholders influence and share control over development initiatives and the decision and resources which affect them.” (p. 213).

Since the form of stakeholder participation is highly dependent on the specific decision-making process, its goal and participants (Luyet et al., 2012), this thesis will follow the definition of Gardner et al. (2009), who specifically worked on climate adaptation. They recognised that stakeholders are not only to be engaged in the decision-making process but also the subsequent steps such as implementation and monitoring (Gardner et al., 2009). As such the definition of stakeholder engagement that will be used in this thesis is “the process that involves stakeholders in some form of collaborative effort directed towards a decision, which might involve future planning and/or behaviour change” (Gardner et al., 2009, p. 11).

2.2.1 Benefits

In literature, many claims have been made on the importance of stakeholder participation, especially in the field of environmental policy (Reed, 2008). Visser et al. (2019) differentiate four different angles from which the benefits of stakeholder participation can be identified: instrumental value as well as democratic goals for both government and participants. Similarly, Reed (2008) distinguished between normative benefits, focussing on the advantages for a democratic society, citizenship and equity, and pragmatic benefits, focusing on the durability and quality of decisions made through stakeholder participation. To analyse the benefits of stakeholder participation in broader environmental policy, these two frameworks have been merged by the author and other benefits identified in literature have been added (see Figure 2-3 for a visualisation).

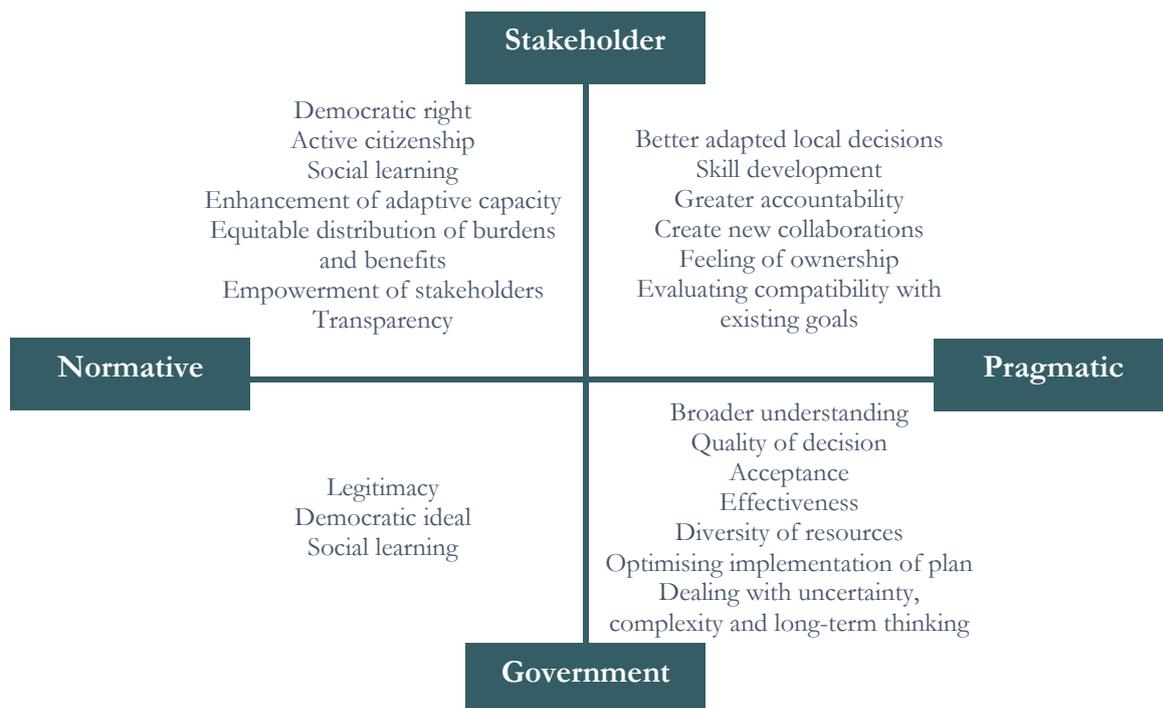


Figure 2-3. Benefits of stakeholder participation from four different perspectives

Own elaboration, based on: Fung, 2015; Gardner et al., 2009; Luís et al., 2018; Luyet et al., 2012; Mees, 2017; Munaretto et al., 2014; Reed, 2008; Uittenbroek et al., 2019; Visser et al., 2019.

First of all, there is **pragmatic value for the stakeholder**. When stakeholders are engaged, solutions are more likely to apply to the local socio-cultural and environmental circumstances (Luyet et al., 2012; Reed, 2008; Visser et al., 2019) and stakeholders have the chance to develop certain skills during the participatory process (Visser et al., 2019). Furthermore, there is a possibility for greater accountability for the implementation of created plans (Munaretto et al., 2014) as a result, to feel ownership of the process and solution (Reed, 2008). Moreover, stakeholder engagement enables the transformation of antagonistic relationships into new partnerships (Reed, 2008). Lastly, engagement provides stakeholders with the possibility to analyse the compatibility of the newly developed plans with previously set goals (Munaretto et al., 2014).

Secondly, there is **pragmatic value for the government**. This entails a broader understanding of the topic, the related issues, possible solutions and alternative perspectives (Gardner et al., 2009; Luís et al., 2018; Luyet et al., 2012; Munaretto et al., 2014). As a result, higher quality decisions can be made, because the decision can be based on (more) complete information, including diverse types of knowledge, approaches, experiences and opinions (Gardner et al., 2009; Luís et al., 2018; Luyet et al., 2012; Reed, 2008). However, it must be noticed that this is highly dependent on the quality of the participatory process (Reed, 2008). Furthermore, there is likely an increased acceptance of the decision, which can avoid opposition later on in the process (Gardner et al., 2009; Luís et al., 2018; Munaretto et al., 2014) and facilitate the implementation of the plan (Luyet et al., 2012; Reed, 2008). Both the increased quality of the decision and increased acceptance might also lead to improved sustainability of the initiative (Gardner et al., 2009). Some scholars also mention a potential for increased effectiveness of the process, but this is not necessarily always the case (Fung, 2015; Gardner et al., 2009). Lastly, engagement with stakeholders has been suggested as a way to deal with uncertainty (Munaretto et al., 2014) as well as with complexity and long-term thinking (Uittenbroek et al., 2019), which could be valuable in dealing with the unpredictable effects of climate change.

Thirdly, there is **normative value for the government**. Most importantly, engaging stakeholders will lead to the legitimacy of the decisions and potentially also of the governing body (Mees, 2017; Reed, 2008; Visser et al., 2019). However, Fung (2015) argues that this is rather a desire than a guarantee. Next to this, stakeholder engagement adds to the democratic ideal of a state (Visser et al., 2019) and increases social learning, which occurs when the governmental body learns from the different types of knowledge and experiences stakeholders brings to the table (Luyet et al., 2012; Munaretto et al., 2014; Reed, 2008).

Stakeholders can of course also learn from the governmental body and each other, meaning social learning is also of **normative value for the stakeholder** (Luyet et al., 2012; Munaretto et al., 2014; Reed, 2008). Furthermore, engaging in decision-making processes enables stakeholders to make use of their democratic right (Luís et al., 2018) and realise active citizenship (Visser et al., 2019). Stakeholders can be empowered by the process, through the co-generation of knowledge and benefits and burdens can be shared equitably among the different stakeholders, enhancing social justice for marginalised groups (Munaretto et al., 2014; Reed, 2008). Lastly, it is likely that processes become more transparent and that the adaptive capacity of the system is enhanced (Munaretto et al., 2014; Reed, 2008) resulting in decreased vulnerability to the expected effects of climate change.

2.2.2 Limitations

Many scholars who have written about the benefits also mention the limitations of stakeholder participation. First of all, stakeholder participation can decrease the efficiency of the process, as it takes time and costs money to identify stakeholders and engage them in the process (Luyet et al., 2012; Visser et al., 2019). Moreover, there are high risks associated with engaging stakeholders (Visser et al., 2019). For example, new conflicts can be identified during the process (Luyet et al., 2012; Wamsler, 2017) and there is a chance that the engaged stakeholders are not a proper representative of their social group (Luyet et al., 2014; Munaretto et al., 2014). Furthermore, engagement encourages the empowerment of stakeholders that were already important before, reinforcing existing power structures and privileges (Luyet et al., 2014; Munaretto et al., 2014; Reed, 2008). Together with the fact that stakeholders have different capacities to express their views (Munaretto et al., 2014), this may lead to the discouragement of expressing minority views (Reed, 2008). Lastly, there is a risk of consultation or participation fatigue, when stakeholders feel that they either do not have a real influence on the decision or that the process has been set up to delay action (Reed, 2008). This can also lead to stakeholder frustration and disappointment (Fung, 2015; Luyet et al., 2012; Reed, 2008). Figure 2-4 list all these limitations.

Decrease efficiency	No representativeness	No minority views
New conflicts identified	Reinforcement of existing power structure	Participation fatigue and frustration

Figure 2-4. Limitations of stakeholder participation

Whether these risks become reality depends on the conditions under which the participation takes place. Several drivers or barriers have been identified, such as the capacity of the public authority to encourage engagement, existing power structures and personal levels of the stakeholders, related to, for example, awareness, perceptions and beliefs (Wamsler et al., 2020). Therefore, Wamsler et al. (2020) argue that current stakeholder participation is not always desired in environmental decision-making processes. They found that citizen participation in the development of NBS and other climate adaptive measures regularly hampers sustainable outcomes, which is likely due to the way the engagement is set up and a lack of support to facilitate citizen participation (Wamsler et al., 2020). To address this, financial and human

resources, as well as capacity development and adequate mechanisms and structures, are needed (Wamsler et al., 2020). When this is available, the potential limitations can be mitigated and the advantages can be utilised.

2.3 Implementation

One of the benefits of stakeholder participation that is frequently mentioned is acceptance, which is supposed to facilitate implementation (Gardner et al., 2009; Laktić & Pezdevšek Malovrh, 2018; Luís et al., 2018; Munaretto et al., 2014). However, clear definitions of the concept are often missing (Wüstenhagen et al., 2007), even in studies that claim to measure acceptance (Adell, 2007). Wüstenhagen (2007) aimed to partially solve this by distinguishing three dimensions of acceptance: socio-political acceptance, community acceptance and market acceptance. Socio-political acceptance concerns acceptance by the public, key stakeholders and policy makers of developed technologies and policies; community acceptance zooms in on the local level where a policy is supposed to be implemented and refers to acceptance by the local stakeholders, specifically citizens and local authorities; and market acceptance is about the market adoption of a technology or innovation (Wüstenhagen et al., 2007). However, because of the focus of this thesis on municipalities and climate change being both a national and local issue, it seems necessary to merge the first two dimensions when talking about policies related to climate change (Dreyer & Walker, 2013).

Nonetheless, this still does not define acceptance; it is rather an angle to look at acceptance. A different definition of acceptance is given by Jager et al. (2020), who see acceptance as the contrary of opposition to a decision. As a result, they expected that decisions made through successful negotiations in a participatory process reduce the possibility of non-compliance, and as a result ease implementation, where implementation is defined as *“putting a more abstract plan or rule into operation by making it more concrete or developing specific measures (i.e., implementation is a process).”* (Jager et al., 2020, p. 391). At the same time, they expected that acceptance might stimulate stakeholders to comply with measures or to take action themselves (Jager et al., 2020). In the same way, Wüstenhagen (2007) argues that many barriers for successfully conducting a project, especially when looking at implementation, circulate back to a lack of acceptance.

However, when these expectations were empirically tested by statistically analysing over 300 participatory decision-making processes, Jager et al. (2020) found two important things: participatory processes do not always lead to acceptance and acceptance does not always lead to implementation. Regarding the first finding, they found that only specific design elements of the participatory process have a high positive influence on acceptance. Using the Democracy Cube by Fung (2005), they looked at the influence of representation, communication and power delegation on acceptance and implementation. A direct positive link was found between power delegation in the decision-making process and a higher acceptance of the decision (Jager et al., 2020). Furthermore, it was found that acceptance is increased when stakeholders perspectives converge, which happens through four social intermediate outcomes: conflict resolution; trust building; identification of mutual gains; and building shared norms (Jager et al., 2020). A strong link between power delegation and communication in the decision-making process and the social intermediate was found, meaning that indirectly power delegation and communication also lead to higher acceptance (Jager et al., 2020).

Regarding the second finding, it was found that acceptance only has a weak positive influence on the implementation, meaning that acceptance does not always lead to implementation. Also, the social intermediate outcomes did not seem to play a significant role. This might be because a clearer distinction between acceptance and support has to be made, linking support to action. This was done by Dreyer and Walker, who argue that: *“...both acceptance and support include a positive attitude towards the policy, but only support includes the behavioural dimension of intent or action”* (p. 355).

By defining acceptance like this, acceptance represents a passive attitude structure, whereas support transforms this into an active attitude structure and an active behavioural dimension (Dreyer & Walker, 2013). Nonetheless, this still poses questions as to how support and subsequently implementation can be achieved, what barriers stand in the way of doing so and what drivers enable this process.

2.3.1 Barriers and Drivers for Implementation

In recent years, academic research has started to look at what social factors and conditions hinder action towards climate adaptation (Biesbroek et al., 2013). Yet, what a barrier is, is hardly ever defined (Biesbroek et al., 2013). In this thesis, the definition of Moser and Ekstrom (2010) will be used, who see barriers as “*obstacles that can be overcome with concerted effort, creative management, change of thinking, prioritisation and related shifts in resources, land uses, institutions, etc.*” (Moser & Ekstrom, 2010, p. 22027). Quite often, barriers appear to be limits, which are obstacles that cannot be overcome (Moser & Ekstrom, 2010). As a result, barriers can make climate adaptation less efficient, lead to higher costs or delay the whole process (Moser & Ekstrom, 2010). Furthermore, barriers can reinforce each other and lead to inactivity (Lawrence, 2015). By understanding how this happens, the attention can be shifted towards barriers being enablers for change (Lawrence, 2015). Nonetheless, overcoming all barriers does not automatically lead to fruitful results and a successful process is hardly ever free of barriers (Moser & Ekstrom, 2010).

When looking for literature that focuses on barriers to climate adaptation, almost all research is about barriers for governmental bodies. Amundsen et al. (2010) identified four main barriers to take climate adaptive action at the Norwegian municipal level, which are unfamiliarity with the current data on climate change, lack of data, lack of expertise to deal with the effects and impacts of climate change and an unclear role for the municipality in this topic. Mees et al. (2012) looked at existing literature and also found four main issues that are challenging to the governance of climate adaptation. These are uncertainty about climate change, its impacts and the effectiveness of measures, spatial diversity, controversies related to different values and discourses in society and social complexity, as adaptation requires attention from all levels of governance (Mees et al., 2012). Lastly, limited funding has been mentioned by several authors as a more practical barrier to climate adaptation (Dowds & Aultman-Hall, 2015; Ziervogel & Parnell, 2014).

Furthermore, many authors have attempted to categorise barriers. Biesbroek et al. (2013) have done an extensive literature review on this topic and found that both the amount of barriers and categorisations seems to never end. In a different paper, Biesbroek et al. (2011) identified seven categories of barriers: conflicting timescales; substantive, strategic and institutional uncertainty; institutional void; institutional fragmentation; lack of awareness and communication; motives and willingness to act; and a lack of resources. Ekstrom and Moser (2014) reduced this to four categories: institutional; attitudinal; financial; and political. Thaler et al. (2019) build on this by adding one more category and including both barriers and drivers in the categorisation. As such, they end up with five categories of barriers and drivers: political; technical; resource-based; informational and cognitive; and social and cultural (Thaler et al., 2019).

Using this categorisation, Thaler et al. (2019) found several drivers for local governments to take climate adaptive action, such as political will, risk awareness and financial support/subsidies. Also van den Ende (2021) used this categorisation to identify drivers for municipalities in the Netherlands. They found for example clarity on authority and responsibility, legal feasibility and leadership as drivers to take climate adaptive measures. However, similar to a barrier, what a driver is, is hardly ever defined (Simonet & Leseur, 2019). Simonet and Leseur (2019) define drivers for climate adaptation as the opposite of barriers:

“factors and conditions that stimulate collective abilities and efforts to reorganise, restructure or reconue the local system to current and future impacts of climate change” (p. 624). Although following this definition both barriers and drivers impact the implementation of climate adaptive measures, an overwhelming amount of studies only addresses barriers and does not mention drivers at all. Especially for stakeholders this information is lacking.

2.4 Summary Literature Review

This literature review presented insights on the importance of climate adaptation, which is because of the detrimental effects of climate change on society’s health and safety, ecosystems and economy. Three responses are identified: coping; incremental adaptation; and transformative adaptation. The choice for the type of strategy is outlined in adaptation strategies and agendas, which are being developed by increasingly more, mainly local, governments. Next to this dedicated approach to climate adaptation, some governments take a mainstreaming approach, where climate adaptation is integrated into already existing domains and policies. A combination of these two, in the form of a “dual track approach” is recommended as a way to move forward.

Furthermore, the importance of the engagement of stakeholders was demonstrated, which is mainly because of the need for solutions on both public and private land. Public authorities, local communities and private entities play different roles in the development and implementation of climate adaptation strategies, depending on e.g. the governance mode. Four governance modes for climate adaptation are identified: hierarchical; market; networking; and community. Within each type of governance different forms of participation exist. Many benefits for participation can be given, such as social learning, feelings of ownership, transparency, better adapted local decision and acceptance. Also drawbacks of participation can be listed, such as decreased efficiency and participation fatigue. However, whether these benefits and drawbacks become reality largely depends on the design of the participation.

One of the potential benefits of participation is acceptance, but it is unclear how it relates to implementation. It is found that it is rather support, as an active form of acceptance, that will likely increase implementation. However, barriers and drivers to create support or to facilitate implementation are fragmented across literature and mainly focus on governmental bodies. Barriers and drivers specifically for non-governmental stakeholders are hardly discussed in literature and as such provide a gap for further research.

3 Theoretical Framework

This chapter presents the theoretical framework of this thesis, which will be used to analyse the results later on. First of all, in *section 3.1* the process of climate adaptation is discussed. This is followed by *section 3.2*, where the adaptive governance and its three main features - flexibility, participation and learning - are introduced. In *section 3.3* these features are combined with the process of climate adaptation to create an adaptive governance framework for climate adaptation.

3.1 Process of Climate Adaptation

To diagnose barriers and drivers in the implementation of climate adaptive measure, Moser and Ekstrom (2010) created a policy cycle for climate adaptation. This policy cycle describes the process of adaption, which is visualised in Figure 3-1. The process consists of three main phases, and each of these phases has three stages. The first phase of understanding involves the stages of problem detection and awareness raising, gathering and using the information to deeper understand the problem and (re)defining the problem (Moser & Ekstrom, 2010). The subsequent phase of planning consists of the development of adaptation options, the assessment of those options and the final selection of the solution(s) (Moser & Ekstrom, 2010). This is followed by the last phase of managing, which concerns the practical implementation of the chosen option(s), monitoring the solutions as well as the environment and evaluating (Moser & Ekstrom, 2010). All three phases combined are seen as the implementation of climate adaptive measures (Moser & Ekstrom, 2010), demonstrating that implementation is a process. Although real-life practices do not strictly follow the phases in this order, the model provides a useful framework of the process of climate adaptation.

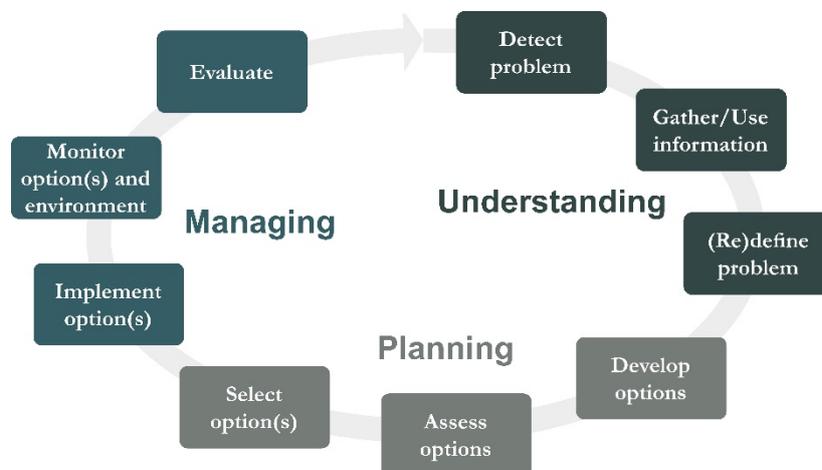


Figure 3-1. Phases and stages in the process of climate adaptation, adapted from Moser and Ekstrom (2010)

This framework can be used to determine the barriers and drivers in different moments of the climate adaptation process. This was done by Moser and Ekstrom (2014) per stage as well as by van den Ende (2021) per main phase. To aid this process, barriers and drivers can be categorised in different types, such as the categorisation by Thaler et al. (2019): political; technical, resource-based, informational and social-cultural. This categorisation will also be used in this thesis.

3.2 Adaptive Governance

The concept of adaptive governance has only been developed at the beginning of this century but has quickly gained attention among scholars from various disciplines such as international trade, health, disaster management, political science and law (Chaffin et al., 2014). Different definitions exist, but all definitions view adaptive governance as a system of environmental

governance that is able to manage uncertainty and complexity in social-ecological systems (Chaffin et al., 2014). As such, adaptive governance is “*a range of interactions between actors, networks, organisations, and institutions emerging in pursuit of a desired state for social-ecological systems*” (Chaffin et al., 2014, p. 7).

As climate adaptation is characterised by uncertainty and complexity, adaptive governance seems to be a promising governing mode (Munaretto et al., 2014). Stakeholder **participation** plays an important role in this. As discussed in *section 2.2.1*, several benefits of participation can be mentioned that can help reduce uncertainty and complexity. For example, participation leads to a broader understanding of the topic and possible solutions. This is because the knowledge base for decision-making is improved by the integration of different kinds of knowledge and perspectives (Munaretto et al., 2014; Rijke et al., 2012). As a result, higher quality solutions that are better adapted to the local context can be developed. This is further facilitated by experimentation and continuous collective **learning** from the experimentation (Munaretto et al., 2014; Rijke et al., 2012). Other features are polycentric institutions that operate at multiple scales, collective deliberation, social memory, resilience management and adaptive capacity development (Munaretto et al., 2014). Furthermore, leadership of organisations or individuals serves as a catalyst “*by strategically bringing together people, resources and knowledge*” (Rijke et al., 2012, p. 74). Because of these features, adaptive governance is most suitable for small-scale, local social-ecological systems (Munaretto et al., 2014).

The way adaptive governance takes form depends on the purpose of governance, which can be different at various points in time (Rijke et al., 2012). For example, sometimes it is needed to coordinate activities, whereas another time it seems more necessary to generate and distribute knowledge (Rijke et al., 2012). Therefore, **flexibility** is of great importance. Also, concrete adaptation measures need to keep a great deal of flexibility to allow for adjustments when more information comes to light (Munaretto et al., 2014). For instance, designing water storage systems in a way that allows for midterm modification to be able to deal with more extreme storms and floods (Munaretto et al., 2014). These “no-regret” measures show how adaptive governance embraces uncertainty as a facilitator to take action, rather than letting it lead to inaction (Munaretto et al., 2014). As such, the likelihood that transformational adaptive measures are implemented increases (Colloff et al., 2017) and different futures are accommodated (Mees et al., 2012).

From this description of adaptive governance, three features appear to be most important for this new mode of governance: flexibility, participation and learning (Munaretto et al., 2014). In the following sections, each feature will be discussed and a model adapted from literature will be given. Together these models will be used to create a framework for adaptive governance of climate adaptation.

3.2.1 Flexibility

The first feature of adaptive governance, flexibility, takes form in the flexibility of the governance approach. The four governance modes described in *section 2.1.3* following Bednar and Henstra (2018) largely correspond to a model that is used in the Netherlands for climate adaptation (PBL, 2015). This model was developed by the Dutch School of Public Administration (NSOB) and is often referred to as the NSOB model (Steen et al., 2014). To fit the scope of this research, the NSOB model, which was not specifically developed to fit climate adaptation, is combined with the four governance modes described by Bednar and Henstra (2018). As such four governance modes appear in a square, which is visualised in Figure 3-2.

First of all, there is **legitimate** governance, which is similar to hierarchical governance as described by Bednar and Henstra (2018). In this mode, the government takes decisions and

there is little room for stakeholder engagement. Secondly, there is **achieving** governance, for which the definition of market governance by Bednar and Henstra (2018) is followed. As such, governmental bodies are seen as a company and stakeholders as its clients. Measurable goal achievements determine success. Thirdly, there is **networking** governance, which is similar in both the NSOB model and as described by Bednar and Henstra (2018). Collaboration between governmental bodies and stakeholders are central in this type of governance. Lastly, there is **participatory** governance, which is somehow similar to community governance as described by Bednar and Henstra (2018). However, a major difference is that Bednar and Henstra (2018) still describe the stakeholders as participants, whereas in the NSOB model the governmental bodies participate with stakeholders (Steen et al., 2014). As such, stakeholder participation is transformed into ‘governmental participation’ (Steen et al., 2014). The government can play an active role in the facilitation of the activities in this governance mode, but can also play a more passive role (Steen et al., 2014). This decision is largely up to the stakeholders.

It is often assumed and promoted that network governance is the ideal way of governing climate adaptation (Bednar & Henstra, 2018). However, as the four types of governance aim to demonstrate, network governance is just one ideal vision of adaptation governance (Bednar & Henstra, 2018). Furthermore, it should be noted that in reality, governance modes are often mixed, due to governance effectiveness and failure (Bednar & Henstra, 2018). Fleming and Rhodes (2005) go even further and emphasize that the future lies in effectively mixing all four governance modes, which should be done by governments. Moreover, over time different modes can be used, depending on the stage of the policy (Bednar & Henstra, 2018; Mees, 2017). Therefore, the four governance modes will be used to demonstrate flexibility in adaptive governance.

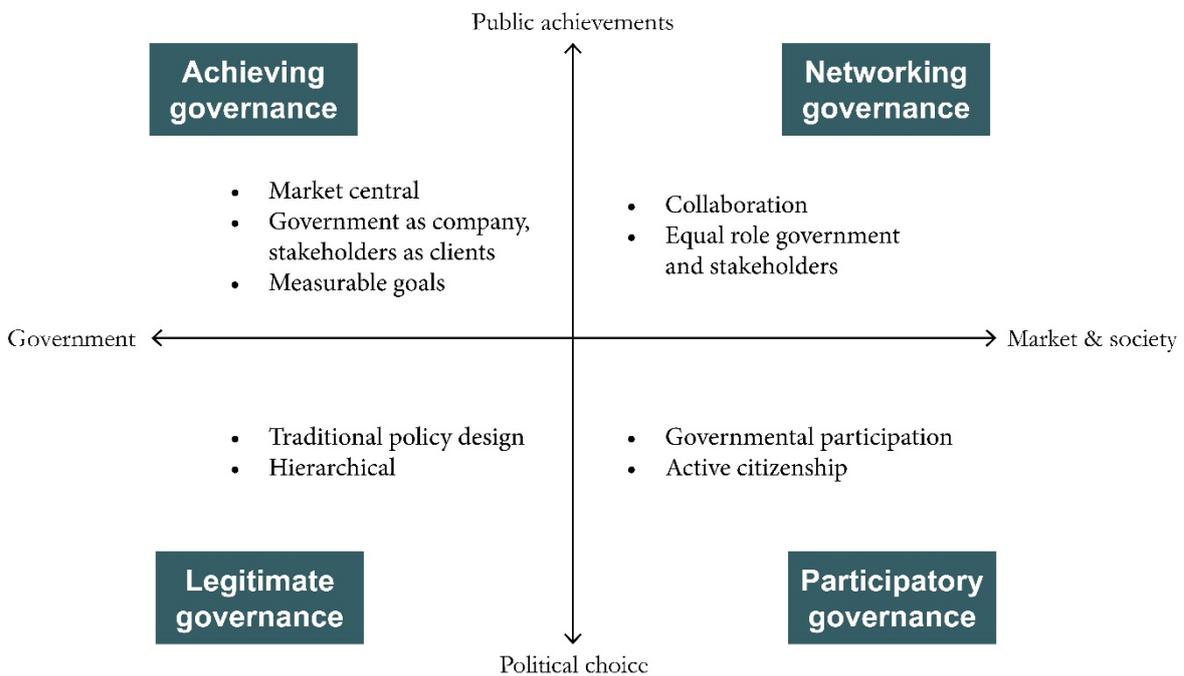


Figure 3-2. Governance modes, adapted from Bednar and Henstra (2018) and Steen et al. (2014)

3.2.2 Participation

Participation is the second key feature of adaptive governance. To understand when participation is valuable, it is important to understand the most feasible and useful varieties of participation in a specific context (Fung, 2006; Uittenbroek et al., 2019). This can be done by looking at the design of the participatory process. To classify and compare the different designs

of participatory processes, many frameworks have been developed over the past years by researchers from various disciplines, such as public administration, urban planning, communication, psychology and social sciences. Most of these frameworks have been created for public participation, but often they present “a space in which any particular mechanism of public decision can be located” (Fung, 2006, p. 66), and therefore can also be applied to the broader concept of stakeholder participation.

The first and most famous typology has been developed by Arnstein (1969), who created a “ladder” of participation for citizen engagement. As can be seen in Figure 3-3, the ladder distinguishes eight forms of participation, where each rung up corresponds to more citizen power. These eight rungs have been grouped in three levels: nonparticipation, which is about curing or educating people; tokenism, which allows for opinions being heard, but the final decision still lays with the powerholder; and finally, citizens power, where citizen are in the decision-making seats and have (almost) full power. (Arnstein, 1969)

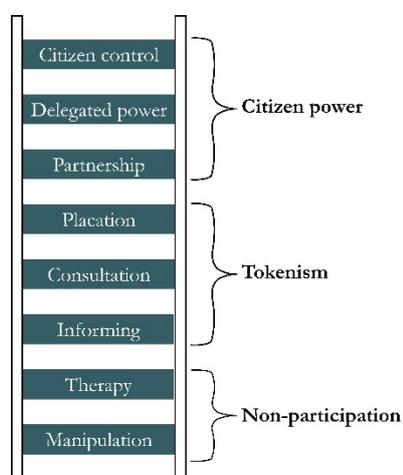


Figure 3-3. Participation ladder, adapted from Arnstein (1969)

Although this ladder of participation is still in use – not always with these eight rungs, but with the ladder as a metaphor - and provides a useful framework to classify participation, it has received considerable criticism. Fung (2006) for example argues that this typology mixes the level of citizen power with normative approval, as engagement is perceived ‘best’ when it scores high on the ladder. However, every situation is different and it is not always desirable to have high levels of citizen power (Collins & Ison, 2006; Fung, 2006). Citizen control is hardly ever the goal of participation, it is rather one of the many ways to arrive at a shared decision (Collins & Ison, 2006). As such, this framework fails to capture the dynamic and flexible nature of stakeholder engagement (Collins & Ison, 2006).

Fung (2006) tried to address the above-mentioned critiques with the development of the three-dimensional Democracy Cube, where each of the sides represents a different dimension of public engagement (see Figure 3-4). The first dimension defines who participates and is measured from more inclusive to more exclusive. Participation can be **open** to **everyone** who wishes to attend, where the actual participants are **self-selected**; they decide to engage. This can result in unrepresentative participants and only certain people will engage. To overcome this, specific groups that are less likely to engage can be **recruited** for participation by the organiser. However, to guarantee the best representativeness, **random selection** can be applied. Fung (2006) then goes on to describe lay stakeholders, professional stakeholders, professional politicians and expert administrators, but by doing so the stakeholders are interchanged with governmental representatives (Miller et al., 2019). Therefore, these are left out for this thesis

and instead, inspired by Miller et al. (2019) **closed with targeted recruitment**, where the invited stakeholders have the freedom to decline, and **completely closed**, where stakeholders are exclusively selected and also accept the invitation, are added.

The second dimension of the Democracy Cube describes how participants communicate with each other and the organiser, as well as how decisions are made. Here a scale has been developed from least intense to most intense. It starts with **listening as a spectator**, but often this is accompanied by the possibility to **express preferences**. Sometimes there is also the option to create or **develop preferences**, potentially together with other participants. The next step would be to **aggregate and bargain** to combine preferences in a social choice. This can also happen with more **deliberation and negotiation**, where interaction, exchange and edification happen before coming to an opinion, which is aimed at reaching consensus. Lastly, a decision can be made through the **technical expertise** of a stakeholder.

The third and last dimension concerns the actual impact or authority, the participants have on the decision, which is rather similar to the proposed ladder by Arnstein (1969). The scale ranges from least authority to most authority and starts with stakeholders to derive **personal benefits** of e.g. edification. However, often stakeholders have more authority than that and exert a **communicative influence** by indirectly altering or mobilising public opinion. This can be followed by more thorough **advice and consultation**, where the organisers are open to receive input from participants. When stakeholders start to have power, two last levels can be identified. Stakeholders can participate in a kind of **co-governing partnership** or stakeholders can exert **direct authority** on the decisions being made.

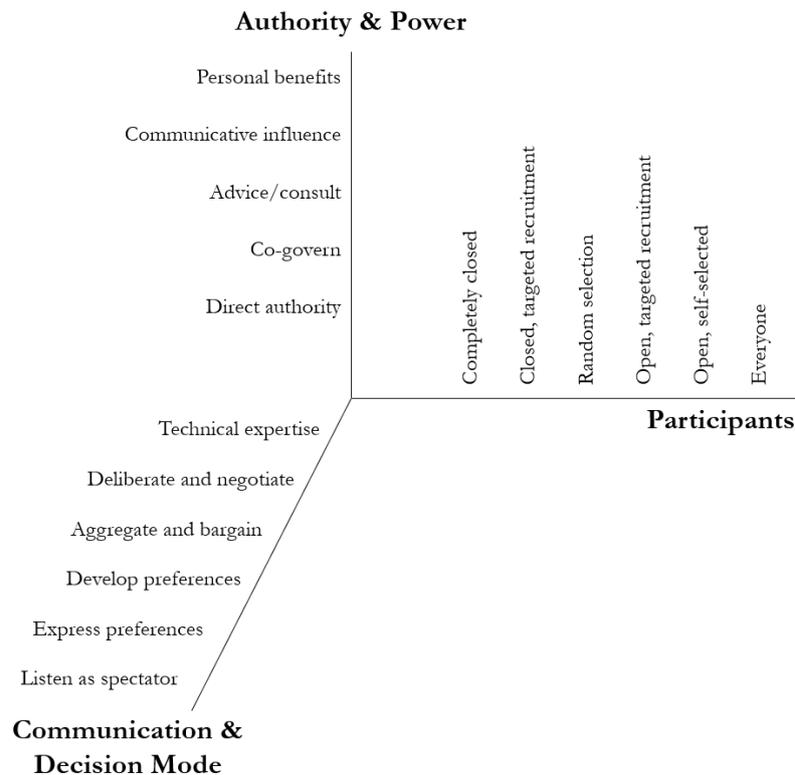


Figure 3-4. Democracy Cube, adapted from Fung (2006)

Together these three interlinked dimensions form the design of the participatory process, which is highly important for the outcome of the process (Fung, 2006). Literature often suggests contextual factors play an equally important role, as well as power relations and scalar fit – the

extent to whether the process is matched to temporal and spatial scales - (Reed et al., 2017). According to Reed et al. (2017), together they form the theory of participation, which explains the outcomes of stakeholder participation. However, scalar fit and power relations can be partially dealt with in the design of the participatory process and as empirically demonstrated by de Vente et al. (2016), contextual factors play an important role but are “*outnumbered by factors linked to process design*” (de Vente et al., 2016, p. 11).

3.2.3 Learning

The third and last feature of adaptive governance is learning. Learning is assumed to be of high importance for developing and sustaining the capacity of different authorities, stakeholders and the public to manage their environment effectively (Pahl-Wostl, 2009). It is a process with multiple steps, where actors experiment with innovation until they arrive at new boundaries, and as such has different levels of scope and intensity (Pahl-Wostl, 2009). To frame these different levels of learning, the concept of triple-loop learning has been developed in organisation theory (Pahl-Wostl, 2009).

Single-loop learning refers to an incremental improvement of the actions taken, without questioning the underlying assumptions (Pahl-Wostl, 2009). The question that is asked here is whether the right things are being done, based on what was decided. Minor tweaks and adjustments are done to the business as usual. When it comes to governance modes, there is no change (Pahl-Wostl, 2009). **Double-loop** learning refers to reframing the assumptions on which actions are based within a value-normative framework (Pahl-Wostl, 2009). This leads to questions such as whether the right things are actually the right things, and therefore requires a reflection on what is right. It also requires thinking outside the box and using creativity to improve the existing situation. Applied to governance modes, this means that the dominant governance mode is called into question (Pahl-Wostl, 2009). For example, a participatory approach or subsidy is introduced where before only a legitimate governance approach was applied. **Triple-loop** learning refers to reconsidering underlying values and beliefs, thus potentially transforming the existing worldview (Pahl-Wostl, 2009). As such, questions as to how to decide what is right and how this can be applied in another situation are relevant. It requires a reflection on how learning takes place, and can also be explained as double-loop learning on double-loop learning. When looking at governance modes, this means that new innovative governance types are established and implemented (Pahl-Wostl, 2009). It is assumed that when learning, the three phases are subsequent steps in the process (Pahl-Wostl, 2009). As such, the levels of double- and triple-loop learning are rather applied on a long-term spectrum, whereas single-loop learning takes place in the short term. The learning loops are visualised in Figure 3-5.

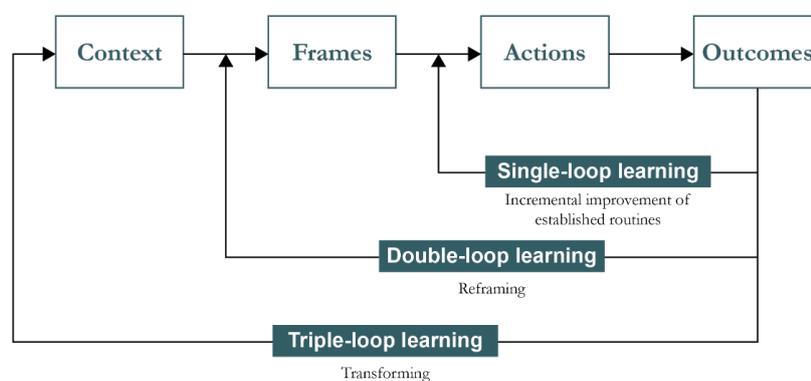


Figure 3-5. Single-, double- and triple-loop learning, adapted from Pahl-Wostl (2009)

3.3 Adaptive Governance in Climate Adaptation

When the process of climate adaptation, including the categorisation of barriers and drivers, is combined with the frameworks of the three main features of adaptive governance, an adaptive governance framework for climate adaptation can be created. This is visualised in Figure 3-6.

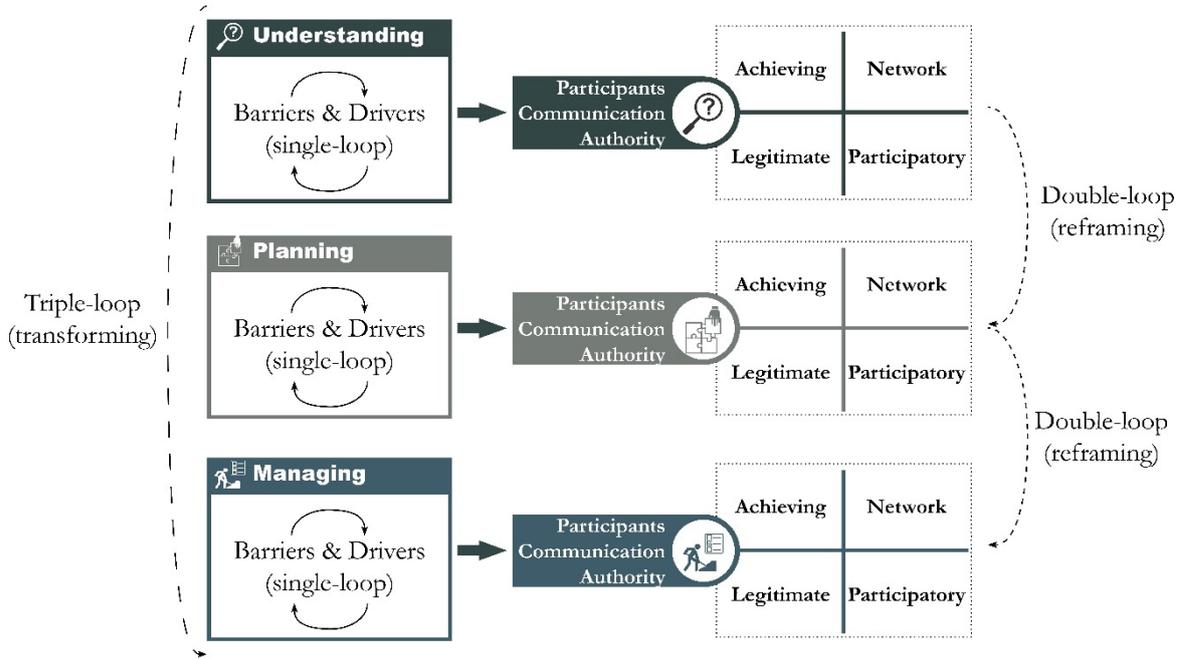


Figure 3-6. Adaptive governance framework for climate adaptation (own elaboration)

In each phase of the process, the barriers and drivers for stakeholders to take action can be identified and categorised through a process of single-loop learning. Questions can be asked on what the barriers and drivers are, what category they belong to and whether they are the correct ones. The information that is gained can be used to determine the most appropriate governance approach, based on the proposed governance modes for flexibility, and the respective participation, based on the three dimensions - participants, communication and authority - of the Democracy Cube. To ensure flexibility between the different phases, double-loop learning is applied, which questions the governance and participation mode of each phase through questions on what the appropriate type of governance and participation is and whether it should be reframed based on insights gained during the previous phase. Lastly, triple-loop learning is applied over the whole process, questioning if this is the right framework and process or whether it should be transformed into a different view on the implementation of climate adaptation. In this way, the three features of adaptive governance reinforce each other: participation enhances social learning, which ensures flexibility, which in turn provides space for stakeholder engagement through the different governance modes.

4 Methodology

This chapter presents the methodology of this study and subsequent methods. First of all, the choice for a case study is explained in *section 4.1*. This is followed by a description of the method for the selection of the case in *section 4.2*. In *section 4.3* it is explained how data was collected and analysed. This is finished with a short section where validity methods for this research are presented.

4.1 Research Design: Case Study

For this research, it was chosen to conduct an in-depth qualitative case study. Several reasons can be mentioned for this choice. First of all, a case study gives the possibility to provide multiple in-depth perspectives on the same topic (della Porta & Keating, 2008). As this thesis aims to get a broader understanding of the views of various stakeholders on climate adaptation, a case study seemed an appropriate method to do so. Furthermore, a qualitative case study fits the type of research questions that are to be answered in this research, namely how questions (Yin, 2014). Lastly, the focus of this study is on contemporary events, on which the author has no control, which is a requirement for doing a case study (Yin, 2014).

Although some authors argue that it is always preferred to do multiple case studies (Yin, 2014), it was decided to conduct a single-case study. The main reason for doing so is that taking into account the time limitations of this research, studying one case allows the researcher to go in-depth (Flyvbjerg, 2006). This is needed since multiple complex topics such as participation and implementation of climate adaptation strategies will be discussed. These topics will be used as themes to analyse multiple subunits of the case, which are the relevant external stakeholders in the to be chosen municipality. As such, this research will be an embedded case study that has the potential to lead to high-level insights into the single case (Yin, 2014). Figure 4-1 visualises this. Furthermore, a single case study that is carefully chosen and well-studied can lead to very credible, robust and trustworthy theoretical explanations (Baxter, 2016). Such explanations can be generalisable in an analytical sense, as they are rooted in both concrete as well as abstract aspects of the case study and others in similar situations can apply the explanations to their context (Baxter, 2016). Similarly, Flyvberg (2006) argues that it is possible to summarise case studies and that problems that occur in the summarisation are rather related to the characteristics of reality than to the case study as a research design. However, it should be taken into account that it is not always desirable to summarise and generalise case studies, as thick rich descriptions can be valuable in themselves (Flyvbjerg, 2006).

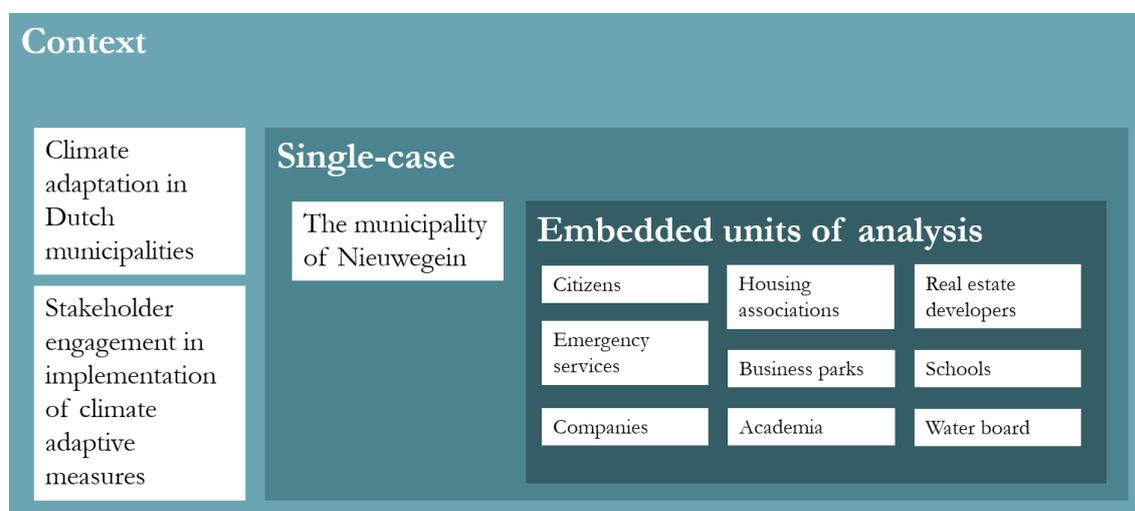


Figure 4-1. Embedded single case study, adapted from Yin (2014)

4.2 Selection of the Case

To find the right case, time and attention were spent in screening the candidate cases by applying a two-phase approach: the first phase requires the collection of relevant quantitative data about the entire pool of cases and the second phase requires the development of a list of criteria that can be used to reduce the number of possible cases (Yin, 2014). The aim is to end up with no more than a dozen candidates and then apply the one-phase approach (Yin, 2014). This one-phase approach requires the collection of some information about each candidate, as well as a set of criteria that can help choose the final candidate for the study (Yin, 2014). Although the two-phase approach requires extra time and is not always done in practice, the benefits for this research seemed to outweigh the disadvantages. With 355 municipalities in the Netherlands (CBS, 2020a) that could all be relevant for this study, it was necessary to find a case that captures the circumstances of everyday situations and is representative of an average municipality in the Netherlands dealing with climate adaptation.

The first step of the two-phase approach for screening the candidate cases consisted of a short quantitative survey among municipalities in the Netherlands. The goal of the survey was to understand what municipalities are doing with regards to climate adaptation and to get an overview of the perceived acceptance and implementation of the already developed strategies and agenda. Although acceptance is not part of this research anymore, it still was when the survey was distributed. It must also be noted that the author is aware that it is hard to measure concepts like acceptance and implementation through a short survey. Furthermore, the survey was only filled in by one person per municipality, meaning that the answers could have been biased. This was already visible with one municipality, where two different people filled in the survey, leading to two slightly different results.

The ten questions were drafted and inserted in Google Forms. Using another survey tool was considered, but for the scope of the survey, Google Forms seemed to be the easiest program to work with, as it automatically translates some of the results into graphs and figures. Furthermore, no advanced options that are unavailable in Google Forms were needed in conducting this survey. The survey was conducted in Dutch as this is the main language of the respondents. The English translation of the questions can be found in Appendix A: Survey questions.

After a final revision, the survey was first distributed by email. Emails were sent to in total 98 municipalities, specifically addressed to employees working on climate adaptation. TAUW provided an initial list of contacts which was expanded by desktop research. For example, the province of North Brabant has an online portal with exemplary adaptation projects in several municipalities and each of these projects listed a contact person that was added to the list. Moreover, all 20 municipalities that are part of the Climate Adaptation Dutch Cities network were sent the survey, as they are expected to fall within the criteria of the case study.

When an informant replied to the email, they were asked to send the questionnaire to contacts they might have at other municipalities, using a snowballing technique. By doing so, the survey was sent to a few more municipalities. After four days a reminder was sent to the municipalities that had not filled in the survey by then. Lastly, the survey was posted on the personal LinkedIn page of the author from where it was shared by eleven people, being colleagues at TAUW as well as other contacts. Here it was explicitly mentioned that the survey was supposed to be filled out by people working at a municipality, preferably people dealing with climate (adaptation). By posting it on LinkedIn, municipalities that were not included in the mailing list could also participate in the survey and a few additional responses were gathered.

A week after the survey was sent, the analysis of the respondents began. This short period was chosen because it was necessary to quickly select a case study, to start planning interviews. Furthermore, after a week already 62 responses were gathered, which was satisfactory for the purpose of the survey. Figure 4-2 shows the steps that were taken for the data analysis:

1. Only valid responses were to be analysed (e.g. responses without name were eliminated). (n=60)
2. From step 1, the municipalities that have finished their vulnerability tests were selected. (n=58)
3. From step 2, the municipalities that have finished or are currently conducting the stakeholder dialogues were selected. (n=55)
4. From step 3, the municipalities where the water board participated in the stakeholder dialogues were selected, because the water board plays an important role in climate adaptation. However, it turned out that this was already the case for all municipalities so no municipalities were eliminated. (n=55)
5. Four main participants were identified, based on their presence in the stakeholder dialogues of the remaining municipalities. These are: social housing associations, citizens, companies and the health authority. From step 4, the municipalities where at least three of these main actors participated in the stakeholder dialogues were selected. (n=33)
6. From step 5, the municipalities that have finished either their climate adaptation strategy or their climate adaptation agenda were selected. (n=14)
7. From step 6, the municipalities that have finished conducting the stakeholder dialogues were selected. This step may seem like a repetition of step 2. However, for step 3 and 4 it was necessary to include a broad range of municipalities. The municipalities that are still in the process of conducting the stakeholder dialogues may not be relevant for this particular research, but they are relevant in determining the main participants. (n=7)

Figure 4-2. Steps for the data analysis for the selection of the case study

Following these steps, the goal was to end up with no more than a dozen municipalities that fit the purpose of this research (Yin, 2014). After step 7, seven municipalities were left and the one-phase approach was conducted, where more information about the selected municipalities was collected through online desktop research. For example, the number of inhabitants was determined for the remaining municipalities. Municipalities that had significantly more or fewer (+/- 50%) inhabitants than the average Dutch municipality (49.000 inhabitants (CBS, 2020a)) were eliminated. This was done to increase the chances of finding an average case and to avoid big municipalities, as they are too complex to analyse within the time frame of this research. Also, local information about climate adaptation was looked up in e.g. news articles and strategies and agendas, to understand what role it plays in the municipality. Lastly, also the amount of stakeholders that participated in the dialogues was revised, where preference was given to municipalities with more stakeholders. The reason for this was to increase the chance of being able to conduct interviews with different stakeholders.

Based on the newly gathered information and consultation with several people, one municipality was selected: Nieuwegein. An email was sent to the respective informant to a) confirm the results of the survey and b) invite them as a case study to this research. It was explicitly asked whether it would be possible to talk to the different stakeholders and whether enough data sources were available to complete this research. Especially this last point is very important, as when doing a single-case study, it is recommended to select the case that is likely to have the most data available (Yin, 2014).

4.3 Case Study Methods

4.3.1 Data Collection

To collect data for this thesis two collection methods were used. First of all, various stakeholders in Nieuwegein were interviewed, which was done through semi-structured interviews. This method of interviewing guides the conversation while at the same time it includes flexibility to discuss unexpected topics and details during the interview (Creswell, 2014). As such, it is commonly used and recommended for case studies (Yin, 2014). Furthermore, interviews allow the researcher to go in-depth in the topic with the interviewee and gather profound explanations and personal viewpoints on the topic (Yin, 2014). By doing so, the behaviour and motivations of the various stakeholders can be studied (Dunn, 2016), which seemed necessary when talking about stakeholder engagement and implementation of climate adaptation. Nonetheless, it should be noted that when conducting interviews, the information is provided in a designated place, rather than the natural context, which can influence the responses (Creswell, 2014). Furthermore, the presence of the researcher can bias responses of the interviewee and will need to be clarified when discussing the results (Creswell, 2014).

The goal was to talk to a wide variety of stakeholders from different sectors, by which multiple perspectives on the topic could be gathered (Rubin & Rubin, 1995). Furthermore, the interviews were targeted at stakeholders that have a (large) potential to implement climate adaptive measures (e.g. schools because of their big, often grey, playgrounds or real estate agents that own a significant amount of buildings). An overview of the interviewees can be seen in Table 4-1 and more information can be found in Appendix B: Interviewees. The interviews were conducted in Dutch, as this is the first language of both the interviewees as well as the author and helps to avoid misinterpretations of the questions.

The interview consisted of an introduction and three main thematic sections. The introduction served to get to know the interviewee, to explain the research and to understand the interviewees' knowledge on the topic of climate adaptation. Afterwards, the climate adaptation strategy and agenda of Nieuwegein were discussed through three themes: a) the development, focussing on the potential engagement of the stakeholder therein, b) acceptance and c) implementation, including potential barriers and drivers and strategies to overcome them. While conducting the interviews, it was found that the engagement of stakeholders in the development of the strategy as well as acceptance did not give any substantial results. This is mainly because there had not been as much engagement as was expected and as a result, most stakeholders did not participate or did not have a vivid memory of how the participants had taken form. Furthermore, many stakeholders were not even aware of the local climate adaptation strategy, which meant that acceptance could not be discussed. Because of these two early findings, the later interviews focused more on the third theme, which is also the main focus of the rest of this thesis. The semi-structured interview guide can be found in Appendix C: Semi-structured Interview Guide. With the consent of the interviewees, the interviews were recorded via the software (Microsoft Teams or Zoom) that was used for the interview.

Organisation	Function
Municipality Nieuwegein	Civil servant working on climate adaptation
Citizen collective Samen Duurzaam Nieuwegein (Together Sustainable Nieuwegein)	Volunteer
Housing association Mitros	Consultant real estate quality and sustainability
Robijn (umbrella organisation of elementary schools in Nieuwegein)	Financial and facility manager
Housing association Jutphaas	Head living and real estate

Wereldhave (owner of shopping centre City Plaza in Nieuwegein)	ESG and sustainability manager
Water board Hoogheemraadschap de Stichtse Rijnlanden	Consultant spatial planning and law (contact person municipality Nieuwegein)
Water board Hoogheemraadschap de Stichtse Rijnlanden	Consultant spatial planning and law (specific project on greening business parks)
Ondernemerskring Nieuwegein (entrepreneur group)	Board member
Club Rhijnhuizen	Consultant (freelancer)
Fortius Real Estate/Custom Property Solutions	Project manager (freelancer)/Director
Emergency services region Utrecht	Risk and safety specialist
Hospital Antonius	Head real estate
BPD	Location manager

Table 4-1. List of interviewees (organisation and function)

In addition to the interviews, various documents were collected. These documents had to be about stakeholders that are present in the municipality (or a similar area) and related to climate adaptation. Furthermore, the documents had to mention something about barriers or drivers for the stakeholder to take action on climate adaptation. With these criteria in mind, three documents were found, of which an overview can be seen in Table 4-2. A link to D1 and D2 can be found in the bibliography, D3 is an internal document that was sent by an interviewee.

Document	Title	Author	Date	Stakeholders
D1	Housing associations and climate adaptation: collaborating on good living	van Veen & Boerbooms (Together climate resilient)	April 2019	Two housing associations in Nieuwegein: Mitros and Portaal
D2	Together to a climate-resilient environment: citizen participation for climate adaptation in Hollands Noorderkwartier	Kreemers, van Brecht, Bakker & Renes (Hogeschool van Amsterdam)	April 2020	Citizens in Hollands Noorderkwartier (a neighbouring region with many similar municipalities as Nieuwegein)
D3	Analysis and advice climate adaptive development in Rijnhuizen: conversations with developers based on the policy climate adaptive development	Sluimer (STIPO, Club Rhijnhuizen and Municipality Nieuwegein)	2020	Various real estate developers in Nieuwegein

Table 4-2. Overview of collected documents

4.3.2 Data Analysis

The collected data was analysed through a content analysis in Nvivo. To do so, the steps suggested by Creswell (2014) were generally followed. First of all, the data was prepared for analysis, which consisted mainly of manually transcribing the interviews that were recorded in their original language. At the same time, an initial coding structure was set up, which focused on the themes of participation in the development of the strategy, acceptance and implementation. Then all the data was coded, which means that pieces of text from the transcribed interviews or documents were put into categories, which are labelled with a term; the code (Creswell, 2014). Throughout this process, the initial coding structure was elaborated with findings from the data, for example by adding ‘lack of awareness’ under the acceptance code, as it was found that many stakeholders were not even aware of the strategy and agenda. Because of this finding, the data guided the thesis in a different direction, focussing on barriers and drivers for implementation, rather than acceptance. Here again, an iterative process was

applied. For example, initially, all barriers and drivers were coded under two codes, being barriers and drivers. In the next cycle of coding, these barriers and drivers were further categorised into subcodes, by which the different barriers and drivers per stakeholder could be identified. Furthermore, many memos were made throughout this analysis, to capture insights or draw connections between different codes (Cope, 2016).

The coding process was then used to generate a description of the climate adaptation process in Nieuwegein, as well as to develop themes. This was done by reviewing the memos, looking at the coded data and trying to find similarities and differences between them through for example the use of concept maps. The themes were further developed and completed with sub-themes and perspectives on the data. These are the major findings from the content analysis and can, together with the coding structure, be found in Appendix D: Codes and Themes. Lastly, an interpretation of the results was made, which in this case was the development and application of the adaptive governance framework to the data.

4.3.3 Data Validation

Although validation of the data is supposed to occur throughout the whole process of data analysis, from transcribing the interviews to creating themes, several validity strategies have been employed to further ensure the accuracy of the data. First of all, triangulation of data sources was applied by using both interviews and documents as data input. The use of different data sources can be used to build a coherent justification for themes, adding validity to the study (Creswell, 2014). Secondly, the interviewees got the opportunity to comment on the final results section. By doing so, they were able to check the accuracy of the results (Creswell, 2014). Moreover, rich and thick descriptions were used to describe the results, which makes them more realistic. Lastly, the researcher's bias in the study has already been addressed in this methodology part, but will also be addressed when discussing the results. Explaining how the findings are shaped by the researcher's background increases the validity of the study (Creswell, 2014).

5 Background: the Netherlands

This chapter gives background information on the Netherlands, on climate change in *section 5.1* and national policies in *section 5.2*. Furthermore, it provides information on Nieuwegein, the municipality that was chosen as the case for this research. In *section 5.3* the local vulnerabilities and policies that address climate adaptation for Nieuwegein are presented.

5.1 Climate Change

The Netherlands has a long history of climate adaptation, mainly because of the high exposure to flooding risks as large parts of the country are located below sea level (Uittenbroek et al., 2019). However, in the past years, it became clear that not only the sea poses risks to the country, as the effects of climate change have become increasingly more visible. The year 2020 went into the books as the hottest year ever, with an average temperature of 11,7 degrees, almost half a degree higher than other years that have been categorised as hot years (Havermans, 2021; KNMI, 2021b). In August 2020, one of the longest and extreme heatwaves² ever hit the country (KNMI, n.d.), leading to a 15% increase in deaths in a week (CBS, 2020b). Heat can also lead to reduced productivity in working places, expanded bridges that cannot be opened anymore and melting of asphalt (WHO, n.d.). It increases energy consumption, as more people will turn to cooling devices such as air conditioning (Hatvani-Kovacs et al., 2016). Furthermore, air and water quality are reduced because of respectively increased chances of summer smog and a higher risk on algal blooms, of which the last also results in more deaths of fish and water birds (WHO, n.d.).

The year was also characterised by extreme drought, with only 695 mm of rain compared to 847 mm in an average year (ANP, 2020). Not only 2020 was a dry year, the precipitation deficit³ has almost doubled over the last fifty years for the months April and May. Furthermore, summers are becoming drier, especially inland (Leunissen, 2020). As a result, the soil dries out, which can have disastrous consequences such as ground subsidence of houses and dikes, fire hazards and agricultural land and crops being damaged (Leunissen, 2020). At the same time, unexpected extreme rainfalls are becoming more frequent. In the last three years, the amount of claimed damages due to water nuisance increased by 77% and the amount of claimed damages due to storms doubled (Stichting CAS, 2020). In an extreme year like 2020, insurance companies expect pluvial flooding and droughts to cost more than 250 million euros per year (Stichting CAS, 2020). These costs are likely to increase even more, especially if no action is taken to minimise the four mentioned risks. It is expected that with a continuation of the current change of the climate damages can cost between 33 and 87 billion euros in 2050, and with an increasing change of climate it can even go as high as 124 billion euros in 2050 (*Deltaprogramma*, 2020).

5.2 Climate Adaptation Policy

To minimise these risks (and costs) of climate change, several ambitions have been formulated by the Dutch government, which are translated into two policy documents: the National Adaptation Strategy (NAS) and the Deltaplan on Spatial Adaptation (DPRA). The NAS, developed in 2016, is an answer to the European Union (EU) Adaptation Strategy, which called for all Member States to develop adaptation strategies by 2017 (European Commission. Directorate-General for Climate Action., 2013). The NAS gives an overview of the most pressing climate risks, being drought, heat, water nuisance and water safety for the Netherlands.

² A heatwave occurs when the central weather station in de Bilt is measuring a maximum temperature of 25°C for five consecutive days, of which three days reach a maximum temperature of 30°C or higher (KNMI, n.d.).

³ The precipitation deficit occurs when more water evaporates than precipitates. This deficit is measured every day in the drought season, which runs from May 1st until September 30th (KNMI, 2021a).

It also shows how these risks can impact the economy as well as public health and safety (Nationale Klimaadaptatiestrategie, 2016). Following the NAS, a concrete agenda has been developed that addresses issues such as the role of health care workers in supporting seniors during heat waves (Uitvoeringprogramma NAS, 2018).

The second policy document, the DPRA, was developed in 2017 and has been updated every year since (*Deltaprogramma*, 2020). It specifically focuses on spatial adaptation: the transformation of public and private spaces to minimize the effects of climate change (Stichting CAS, n.d.). This can be done by for example greening gardens, roofs or parking lots, as green spaces lower temperatures and can store water. Also, dedicated spaces can be created to store water in case of heavy rain or flooding, such as in a retention pond or sustainable urban drainage systems. The DPRA is a collaboration between municipalities, water boards, provinces and the national government and has the aim to accelerate the process of spatial adaptation to create the climate-resilient Netherlands by 2050 (van Bijsterveldt et al., 2021). What this should or can look like is left open to the municipalities, who can give their interpretation to the concept of climate resiliency. The programme consists of seven ambitions, following a methodology of 1) creating awareness, 2) motivating and 3) taking action. Together these ambitions form an iterative circular process that has to be completed every six years (or earlier when needed) (*Deltaprogramma*, 2020). This process is visualised in Figure 5-1.



Figure 5-1. DPRA iterative process, adapted from *Deltaprogramma* (2020)

At the moment, most municipalities are working on the first three ambitions. The majority have already created vulnerability maps, which display the vulnerabilities for an area, and are now conducting so-called risk dialogues (van Bijsterveldt et al., 2021). In these dialogues, municipalities discuss the results of the vulnerability maps with relevant stakeholders and together they prioritise risk areas and discuss who could and should address them (van Bijsterveldt et al., 2021). There is no national guideline on how to conduct the risk dialogues with stakeholders, as it is something that needs to be tailored to the specific context (*Deltaprogramma*, 2020). However, a roadmap was developed, consisting of three main steps: preparing; conducting; and finishing off. Consequently, the municipality sets up a climate adaptation strategy, that envisions what the future will look like (*Deltaprogramma*, 2020). After this, the municipality sets up an acting agenda, which contains concrete measures that can and sometimes have to be implemented by different stakeholders (*Deltaprogramma*, 2020).

5.3 Nieuwegein

The case that was selected for this research is the municipality of Nieuwegein, which is a municipality located in the province of Utrecht, in the middle of the Netherlands. See Figure 5-2 for a map. The municipality was formed in 1971 when two former municipalities merged (Commissie Kennedy, 2021). At that time, Nieuwegein counted 12.200 inhabitants (Commissie Kennedy, 2021). Nowadays Nieuwegein is an average-sized municipality with 63.853 inhabitants (CBS, 2020a). This growth mainly occurred in the first fifteen years, when Nieuwegein grew from 12.200 to 55.000 inhabitants (Commissie Kennedy, 2021). However, still, Nieuwegein is growing. Plans have been made for the development of 2.500 houses in Rijnhuizen, a neighbourhood that already existed as a business area, but that is slowly transforming into a mixed living environment (gemeente Nieuwegein, n.d.). At the moment about 1.000 of these houses have already been built. This increase in inhabitants and houses is mainly due to the growth of the neighbouring city of Utrecht, one of the biggest cities in the Netherlands. Utrecht was but still is, looking for surrounding areas to build more houses (Commissie Kennedy, 2021), as the city is too small for its inhabitants. The municipality of Nieuwegein also belongs to the agglomeration of the city of Utrecht and they are well connected via a fast tram (Commissie Kennedy, 2021).



Figure 5-2. Nieuwegein in the Netherlands

5.3.1 Local Vulnerabilities

In line with the DPRA, the municipality of Nieuwegein has created vulnerability maps, focusing on the four national themes: heat, drought, water nuisance and water safety. Below the risks specifically for Nieuwegein are discussed per theme.

Heat

It was found that Nieuwegein, similarly to the rest of the Netherlands, will be heating up in the coming years. However, there is a big difference between various neighbourhoods and an Urban

Heat Island (UHI)⁴ effect is mainly visible in the city centre, squares and business parks. This is mainly due to large parts of these areas being grey infrastructure. As a result, the temperature in these areas is now 3-5°C higher than in rural areas, but in 2050 this could be 7-12°C higher. (gemeente Nieuwegein, 2018b)

Water nuisance

When it comes to water nuisance, it was found that the most extreme rainfalls in Nieuwegein occurred in the last ten years and that they are likely to become even more frequent. Nieuwegein has not yet experienced a rainfall heavier than 50mm in an hour, but other areas in the province have had rainfalls of up to 65mm in an hour, thus it is expected that Nieuwegein will experience that as well in the future. The sewage system is not able to deal with more than 20mm in an hour and 40-60% of the city consists of hard surfaces that impede the water to infiltrate the ground. Therefore solutions have to be found to deal with this risk, both on public and private land. (gemeente Nieuwegein, 2018b)

Drought

Regarding drought, the risks seem to be relatively small for Nieuwegein. The main risk would be ground subsidence, which is expected to be a maximum of 10cm in 2050. Nonetheless, it has happened before that a street sank 30cm after a period of drought. Therefore, the risk should not be ignored. (gemeente Nieuwegein, 2018b)

Water safety

The last theme is water safety, which is important for Nieuwegein, as it is located next to the river the Lek. Although the risk for a flood is very low, it is reduced even further by the concept of “multi-layer safety”, which consists of three layers. The first layer entails the consistent monitoring and improvement of the dikes, creating more room for the river and preparing for the rising level of the sea. The second layer is about reducing the effects of a potential flood by building in a water-resistant way and placing vulnerable infrastructure, such as energy and drinking water station in safe places. Lastly, it concerns the management of a disaster, for example by setting up evacuation plans. Multi-layer safety is mainly executed by the water board, in collaboration with the province and the various municipalities that are located close to the river. (gemeente Nieuwegein, 2018b)

5.3.2 Local Policies

To tackle the above-mentioned challenges, the municipality of Nieuwegein developed various policy documents:

Vision

In 2018 the municipality created a vision on climate adaptation together with various stakeholders. This vision is valid until the year 2022, afterwards the vision will be adapted based on new insights, making its development an iterative process, following the advice of the DPRA. The vision discusses the risks of climate change in Nieuwegein, sets out what a climate-resilient Nieuwegein should look like in 2025 and 2050, in the form of short-term and long-term plans and lists policy goals for the year 2050. Some of these policy goals are rather abstract, such as: increasing the number of green spaces; stimulating green schoolyards; finding appropriate places to store water; creating plans to minimise the effects of heat; creating a communication strategy for all stakeholders; and mainstreaming adaptation and combining it as much as possible with

⁴ An UHI is an area that is much warmer than the surrounding areas. It often occurs on warm days in urban areas, especially when there are many grey buildings, there is a lot of activity and there are many people. All of these factors contribute to energy being wasted as heat, which warms up the area. (National Geographic, 2011)

other challenges. However, there are also more concrete goals, such as: using a 1-on-1 ratio between grey and green/blue infrastructure in new developments and restructuring of public spaces; having differences of 3-5°C between urban and rural areas on warm days; a place with shade being maximum one minute away by foot; and infiltrating a minimum of 20mm of water in buildings, with 45mm as ambition. Overall, the goals can be summarised in four main goals to be reached by 2050, as visualised in Figure 5-3:

- The city, its citizens and its users experience less heat.
- Water nuisances will be avoided as much as possible.
- The effects of drought will be minimised: water will be stored on the place where it precipitates.
- For water safety, the concept of multi-layer safety will be applied and extra attention will be given to vulnerable objects and essential infrastructure.

Figure 5-3. Climate adaptation goals 2050 for Nieuwegein

To reach these goals, the municipality calls for help from all stakeholders and emphasises the need for collaboration. (gemeente Nieuwegein, 2018b)

Acting Agenda

At the same time as the development of the vision, an acting agenda was developed to display the means, subsidies, stakeholders and programs that are needed to reach the goals set out in the vision. This policy document also runs until 2022. In the agenda, it is acknowledged even more that climate adaptation has to be approached by working together with both internal stakeholders, such as other departments of the municipality, and external stakeholders, such as the housing associations, the water board, citizens, companies and the province. Therefore, each action is assigned to certain stakeholders. Furthermore, the goal, the activity, the result, the financing and the planning of each action are briefly listed. Examples of actions are: a subsidy for the creation of green space for citizens and other parties; the yearly ‘prestation agreements’ between the housing associations and the municipality need to touch on climate adaptation; in the program ‘Better Neighbourhoods’ where neighbourhoods are renovated, climate adaptive measures have to be integrated; continuing the regional collaboration; in the development of new public spaces climate adaptation is integrated from the start; and monitoring the implementation of these actions. (gemeente Nieuwegein, 2018a)

Other policy documents

Furthermore, policy documents from other municipal departments touch upon aspects of climate adaptation. For example, the municipal sewage plan 2019-2022 introduced climate adaptation as a new theme and is aligned with the abovementioned policies. Also, the green structure plan from 2017 supports the specific adaptation policies by promoting green spaces in the municipality. By introducing climate adaptation measures in different policy documents from various municipal departments, adaptation mainstreaming will become more common and it will be easier to implement climate adaptive measures. Of course, care has to be given to ensure that these policies do not contradict but support each other. (gemeente Nieuwegein, 2018b). Next to the municipality, Club Rijnhuizen, which is an intermediary organisation that has as main goal to facilitate the development of the area Rijnhuizen, has set up its own guidelines regarding climate adaptation (Club Rijnhuizen, 2020). This partially overlaps with the policies of the municipality, but it is a bit more ambitious on certain aspects (Club Rijnhuizen, 2020). These guidelines are mainly relevant for real estate developers that want to build in Rijnhuizen.

6 Findings & Analysis

This chapter presents the collected data and the subsequent analysis using the adaptive governance framework presented in section 3.3. As explained in section 6.1, the results will be presented per stakeholder group in section 6.2. Furthermore, section 6.3 presents general results regardless of the stakeholder groups and section 6.4 concludes this chapter.

6.1 Stakeholder Groups

When the interview and document data were analysed, the first finding was that each stakeholder has different needs, goals and pathways to get to climate adaptive measures. As said by one interviewee: *“We understand the questions and problems around climate in urban areas, but the roads to get there, to improve, to optimise and to add value are different.”* (R13). Therefore, it was decided that before applying the adaptive governance framework, the stakeholders were to be divided into stakeholder groups. This division was made based on the type of organisation and relevant background information that was found in the empirical data. The created stakeholder groups, their stakeholders and background information are presented below in no specific order. They are also visualised in Figure 6-1.

Social housing associations

In Nieuwegein there are three social housing associations: Mitros, Portaal and Jutphaas. The majority of Mitros' housing stock is located in Utrecht, where they have more than 20.000 houses, but they also have 5500 houses in Nieuwegein. Portaal is a large national housing association, with a small number of houses in Nieuwegein, about 1500. The last association is Jutphaas, which is a small local housing association with about 1900 houses in Nieuwegein. Mitros and Jutphaas were interviewed and (additional) information on Mitros and Portaal was found in a document. Like all social housing associations in the Netherlands, these groups operate in a space between public and private real estate. They are not for profit and have strong ties with the municipality, with whom they set up 'prestation agreements'. These agreements discuss e.g. rental policy, amount of houses in an area and sustainability. The results for this stakeholder group can be found in *section 6.2.1*.

Citizens

To get an idea of citizens views on climate adaptation a volunteer of a citizen initiative was interviewed. This initiative, called Together Sustainable Nieuwegein (SDN), was born a couple of years ago to promote sustainability in Nieuwegein. SDN used to focus on various topics but due to organisational changes, they decided to focus only on one topic this year, being climate adaptation. SDN works together with other organisations, mainly NGOs and other citizen initiatives. Moreover, a freelancer who works with Club Rijnhuizen was interviewed. This club is a cooperation of the newly developed area Rijnhuizen and supports the transformation of that area from a business area to a shared living space. Citizens, companies and real estate developers are part of the club, which organises information sessions and events and functions as a bridging organisation between the different stakeholders. In addition, a report on citizen participation in climate adaptation from a neighbouring region was used to provide insights. The results for this stakeholder group can be found in *section 6.2.2*.

Real estate developers

Because of the development of Rijnhuizen, where about 2.500 new houses will be built, many real estate developers are working in Nieuwegein at the moment. Next to using insights from Club Rijnhuizen, two additional interviews were conducted. The first one was with a freelancer who works for several small real estate developers as a project manager in transformational real estate. The second one was with the location manager of BPD, the biggest real estate developer

in the Netherlands. Both real estate developers are working on several plots in Rijnhuizen and are part of Club Rijnhuizen. The interviewee from Club Rijnhuizen was also able to provide some insights on the real estate developers. Furthermore, Club Rijnhuizen has also done an inventory of barriers for real estate developers and that document was used as well. The results for this stakeholder group can be found in *section 6.2.3*.

Commercial real estate owners

A big shopping mall, Cityplaza, is located in the city centre of Nieuwegein. The Environmental, Social and Governance (ESG) manager of the owner of Cityplaza, Wereldhave, was interviewed. Wereldhave is a relatively small international real estate owner that owns 11 other malls in the Netherlands. They also do the management of the spaces that are rented out, meaning that they are responsible for things like heating. Furthermore, they take care of the central passage in the mall. The results for this stakeholder group can be found in *section 6.2.4*.

Companies and business parks

There are three business parks in Nieuwegein, but it was not possible to talk to any of their park management, mainly because there is no park management. Therefore instead an interview was held with a spatial planning advisor from the water board, who is working on a project in a business park in a neighbouring municipality. Furthermore, an interview was held with a regional hospital, which can also be considered a semi-company due to the way healthcare is organised in the Netherlands. They have a local establishment in Nieuwegein, which is owned by them, similarly to the majority of buildings they use in the area. Lastly, a board member of a local entrepreneur group was interviewed. This entrepreneur group has about 50 members, mainly SMEs or freelancers. They function as a networking organisation for their members and organise dinners and talks. The results for this stakeholder group can be found in *section 6.2.5*.

Schools

There are 18 elementary schools in Nieuwegein, of which seven are part of foundation Robijn, whose financial and facility manager was interviewed. Within Robijn there are four more schools in a neighbouring municipality. The schools themselves decide about the education, but the foundation takes care of everything else, such as cleaning and maintenance of the buildings. The municipality is the official owner of the buildings, but they are being used as if they belong to the foundation and its schools. The results for this stakeholder group can be found in *section 6.2.6*.

Governmental bodies

This group is a mix of different governmental bodies that (partially) operate on a local scale. First of all the municipality, with two workers on climate adaptation, is part of this group. Furthermore, the water board Hoogheemraadschap De Stichtse Rijnlanden (HDSR) plays an important role. They have three main tasks: safe dikes, clean water and sufficient water, which is about having the right amount of water; not too much and not too little. Because of these tasks, they have strong relationships with several workers in the municipality. Lastly, a specialist from the safety region Utrecht (VRU) was interviewed. This networking organisation functions on a regional level and consists of a fire department, a medical department and municipal crisis management. Their main task is to maintain a safe environment and act upon potential risks in all the 26 municipalities they work with. The results for this stakeholder group can be found in *section 6.2.7*.

Social housing associations		<ul style="list-style-type: none"> • Mitros • Jutphaas • Portaal (document)
Citizens		<ul style="list-style-type: none"> • Samen Duurzaam Nieuwegein • Club Rhijnhuizen • Citizens in Hollands Noorderkwartier (document)
Real estate developers		<ul style="list-style-type: none"> • Fortius • BPD • Real estate developers in Rijnhuizen (document)
Commercial real estate owners		<ul style="list-style-type: none"> • Wereldhave
Companies and business parks		<ul style="list-style-type: none"> • Ondernemerskring Nieuwegein • Water board HDSR (project with business parks) • Hospital St. Antonius
Schools		<ul style="list-style-type: none"> • Robijn
Governmental bodies		<ul style="list-style-type: none"> • Municipality • Water Board HDSR • Safety region Utrecht

Figure 6-1. Overview of stakeholder groups and data input

6.2 Adaptive Governance Applied

Now that all stakeholder groups have been introduced, the data collected from each group will be presented and analysed. First of all, the current actions of the stakeholder group on climate adaptation are presented. Secondly, the barriers and drivers are identified, for which the categorisation is indicated in brackets after a barrier or driver is mentioned. These barriers and drivers are then used to develop intervention points, following the adaptive governance framework. As such, participatory methods and governance modes are presented per phase of the adaptation process.

6.2.1 Social Housing Associations

All housing associations in Nieuwegein are currently getting to know climate adaptation and trying to understand how it can be embedded in their organisation and work. As said by one of the interviewees: *“it is not yet a topic that we are dealing with continuously”* (R5). They are trying to take some first, easily implementable climate adaptive measures, such as campaigns towards their tenants to green their gardens as well as some low-budget measures, such as disconnecting drain pipes or implementing a green roof on one of the buildings. These measures are mainly experiments to generate knowledge, to demonstrate proactiveness and to create awareness on climate adaptation within the organisations. As a result, they are *“not yet translated in requirements, policies and prestation agreements”* (D1). Furthermore, the municipality has recently set up inspiration sessions with the housing associations, to come together twice a year and keep each other up to date on what actions are taking place. *“So it is getting more concrete to exchange experiences”* (R5). Below per phase, the adaptive governance framework is applied, which is also visualised in Figure 6-2.

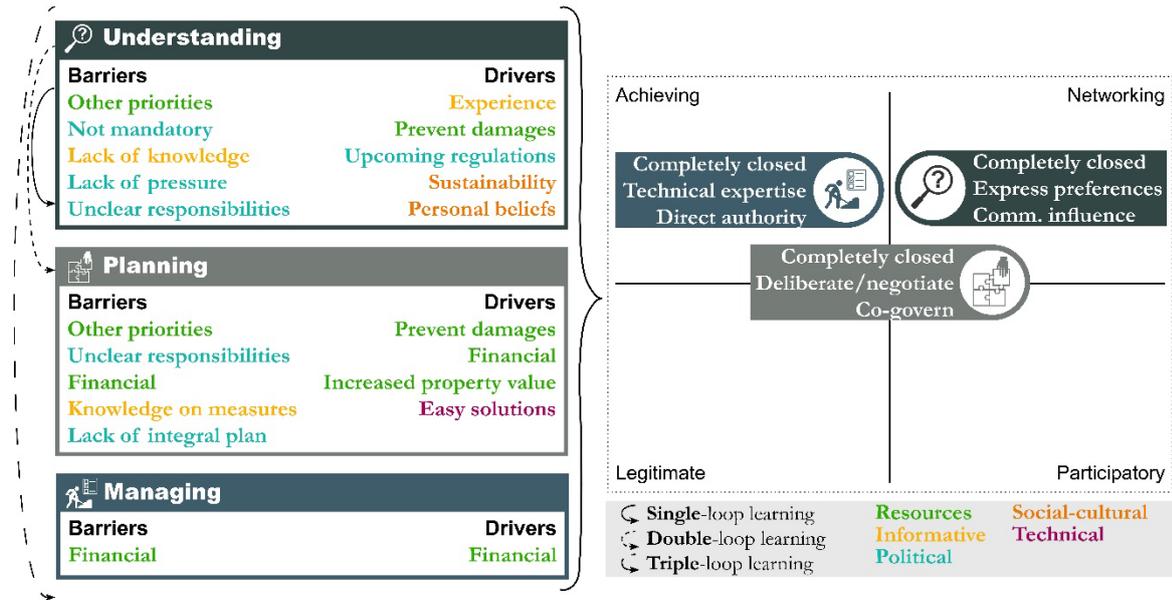


Figure 6-2. Adaptive governance for social housing associations

Understanding

Barriers & drivers

In the understanding phase, which is the phase the housing associations are mainly in at the moment, several barriers play a role to prevent them from detecting the problem, gathering information and/or (re)defining the problem. First of all, they have **other priorities (resources)**. Their main priority and legal responsibility are to offer affordable housing, meaning that availability, affordability and quality of the living spaces are very important. If it is possible to do this sustainably, then that is a bonus. However, “when looking at the topic of sustainability, the energy transition stands out for the housing associations, that is simply the most important. That is our focus.” (R3). Climate adaptation, as well as circularity, is not yet a high priority. This is also because it is **not mandatory (political)**.

This is strengthened by a **lack of knowledge on climate adaptation (informative)**. The housing associations mention that at this moment they do not have a clear picture of where problems could occur, for example, what houses warm up during summer and what buildings are in trouble when it rains a lot. At the same time, they have **experienced (informative)** some of these problems already in real life. Jutphaas mentioned that they “have a couple of buildings that warm up significantly, where blinds are not always sufficient, making it unbearable to live in these houses” (R5). Furthermore, in recent years they have also received complaints about heat and there has been an increase in requests for blinds in summer. However, all housing associations also acknowledge that there is not a lot of **external pressure (political)** from e.g. tenants to do something. This makes it more complicated since they can “only act upon signals we receive from tenants” (R5). However, it is understandable, as many people living in social housing are occupied by other things and do not have the capacity to worry about the climate.

Another barrier for them is that sometimes **responsibilities are unclear (political)**. One of the housing associations was wondering whether adaptation to climate change was their problem to solve, or whether by implementing such measures they were solving someone else’s problem. Therefore, it is unclear what roles the housing association, the tenants and the municipality (should) have as well as who will have to take the financial responsibility.

On the other hand, the housing associations acknowledge that especially water can really damage buildings or even make a building inhabitable for a certain period, which can result in a financial burden. Therefore, **preventing damages (resources)** is a driver to start detecting the vulnerabilities of the buildings. Furthermore, the rise of climate adaptation being embedded in public policies and **regulations (political)** encourages housing associations, knowing that someday it will become mandatory. Lastly, all housing associations **strive towards sustainability (social-cultural)**, as they believe it is the right thing to do. Especially if there is someone within the organisation that pushes climate adaptation higher on the agenda based on **personal beliefs**, this can accelerate the understanding phase.

Interventions

To tackle the abovementioned barriers and optimise the use of the abovementioned drivers in the understanding phase, the municipality can best apply a **network** governance approach. First and foremost it seems important to show and discuss the vulnerabilities with all the housing associations. Therefore this will be **completely closed** participation, as all three housing associations will be engaged, covering all social housing in Nieuwegein. The housing associations can **express preferences** and have a **communicative influence** on the vulnerabilities, which can be shown through a vulnerability test. This will likely increase the sense of urgency and make the problem more manageable since it can lead to a concrete plan in the next phase. Furthermore, the municipality can help “*understand the added value of climate adaptation*” (D1), as partially addressed by the drivers and based on previous experience. These values can consist of societal values, but also on values for the business case, which can be used by the housing associations to stimulate people within their organisation. However, because of the many priorities the social housing associations have, combining it with other discussions is desired. Moreover, example projects can be used to create awareness with tenants, when attention is paid to publicity. This publicity can be facilitated by the municipality, which created a platform for climate adaptation. Although the platform is intended to be used as well by other stakeholders, the housing associations will likely not extensively use the platform themselves in this phase because of other priorities.

Planning

Barriers & drivers

Similar to the understanding phase, **other priorities (political)** and **unclear responsibilities (political)** still appear as barriers when developing, assessing and selecting options in the planning phase. Furthermore, **financial costs (resources)** start playing a more important role. Housing associations have limited financial means, resulting in “*choices where to spend money, since it can only be spent once*” (R5). Especially when talking about bigger projects, this can be a barrier. Furthermore, the housing associations mention that climate adaptive measures do not directly result in financial benefits, as is the case with many solutions in the energy transition. Even within the energy transition, the financial benefits are often for the tenant and not for the housing association. At the same time, as mentioned in the understanding phase, climate adaptive measures can **prevent damages (resources)**, which in turn can **reduce financial burdens (resources)**. Furthermore, it can lead to an increase in **property value (resources)**. However, “*in the theme of climate adaptation [these advantages are] much less clear, making it harder to use it as argumentation in many projects*” (R3). This could also be because of a **lack of knowledge (informative)** on how to deal with the costs of climate adaptive measures. This lack of knowledge also exists with regards to the measures that can be taken. They are unsure about what measures to implement where, what effects potential measures have and how they influence maintenance. What the housing associations do acknowledge though, is that many climate adaptive measures, such as disconnecting the drain pipes or creating façade gardens, are low-budget solutions that can **easily be implemented (technical)**.

A last barrier exists because of a **lack of an integral plan (political)** because climate adaptation is not very present in the prestation agreements between the municipality and the housing associations. This is mainly because the housing associations see this as too early since potential agreements are hard to implement in their specific context.

Interventions

In this planning phase, a **network-participatory** governance approach seems to make the most sense. The housing associations themselves have to come up with plans to create feasible solutions for climate adaptation, potentially tied to existing policies or other sustainability challenges, but the municipality can facilitate and steer that process in a certain direction. Responsibilities can also be discussed and this can be translated into the prestation agreements. As such, the housing associations, still in **completely closed** participation, can **deliberate and negotiate** with the municipality and together they **co-govern** the process. An example of how this is already taking place in Nieuwegein is the inspiration sessions, where the municipality and the housing associations come together to keep each other up to date, to share experiences and to learn from each other. Also, the already existing inspiration book that has been set up by the municipality can help the housing associations to expand their knowledge and facilitate the development, assessment and selection of options.

Managing

Barriers & drivers

In the last phase, no new barriers arise. However, **financial costs (resources)** continue to play a big role, since measures will be implemented and money is needed to do so. At the same time, the **financial benefits (resources)** of measures can become more clear by actually doing it.

Interventions

Since financial factors seem to play an important role in the managing phase, an **achieving** governance approach can be used to deal with this. The housing associations are still represented in **completely closed participation**, but communicate with **technical expertise** and have **direct authority** on what measures they are implementing. The municipality can facilitate that by the already existing subsidy for green spaces but could be expanded to include other climate adaptive measures. However, also a tax could be in place as a financial stimulant to take action.

6.2.2 Citizens

For the citizen stakeholder group, two citizen groups were talked to, with two different approaches to climate adaptation. The first one, Together Sustainable Nieuwegein (SDN), is setting up an action to encourage people to take the tiles out of their garden and put green spaces back instead. Citizens can hand in a garden tile and receive a plant and soil for free from the organisation. The focus is on the front garden since it is easier to “reach”. The second group, Club Rhijnhuizen, is more working with people that already live or just moved to a green neighbourhood and provides them for example with information on how to maintain that space or increase the biodiversity. Their aim is thus rather to prevent people from putting tiles in their garden. The document from the neighbouring region described that in general citizens are not too worried about the potential effects and impacts of climate change, and climate adaptation does not play a role in their daily lives. Below per phase, the adaptive governance framework is applied, which is also visualised in Figure 6-3.

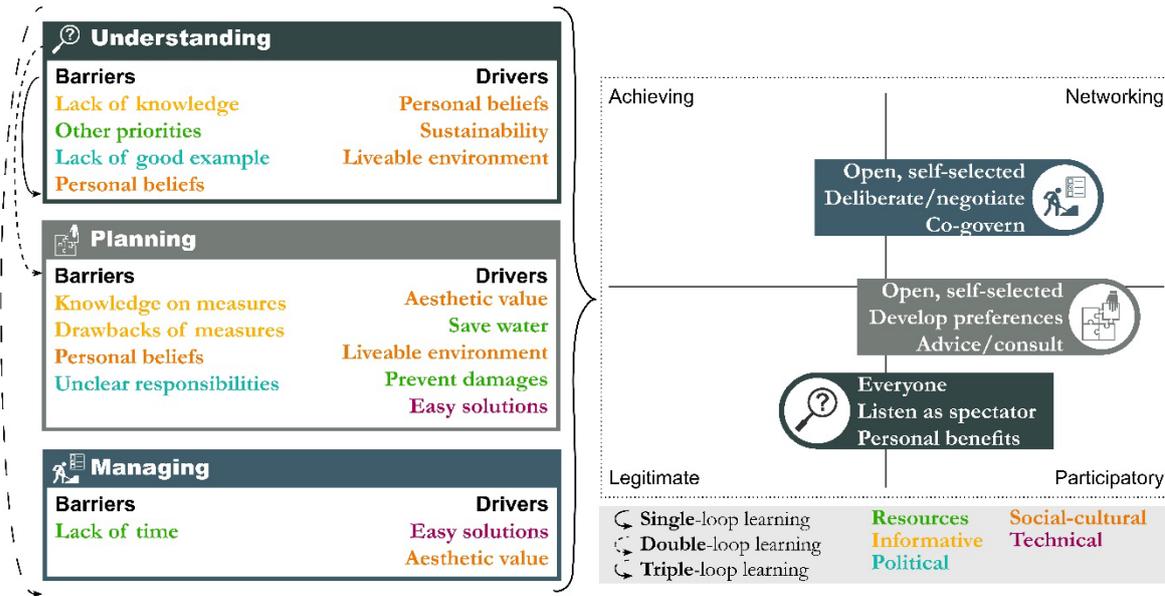


Figure 6-3. Adaptive governance for citizens

Understanding

Barriers & drivers

A first barrier that arises for citizens to start detecting the problem, gathering information and redefining the problem, is a **lack of knowledge (informative)** on what climate adaptation exactly is. Many citizens confuse mitigation with adaptation. Furthermore, the effects of climate change remain vague and there is a big difference between the expected consequences, for example, water problems are expected to have bigger impacts than heat.

A reason for this could be that they have not yet experienced nuisances due to climate change, but also that they have **other priorities (political)**. Especially people with a lower income are already busy enough with their own life and they often cannot deal with other problems such as climate adaptation. Furthermore, it does not help that sometimes a **lack of a good example (political)** from the municipality is felt. For example, “the tramline in Nieuwegein has been renewed, that could also have become a green tram line ... I do not understand why that did not happen” (R2).

Personal beliefs (social-cultural) can also play a role herein, as some people see a very clear distinction between nature and the built environment. One of the interviewees quoted a person with such a view that she saw on TV: “Those bees do not belong in a neighbourhood, they belong in nature” (R10). At the same time, **personal beliefs (social-cultural)** also make that certain people do start understanding the problem. These personal beliefs can be tied to for example **striving towards sustainability (social-cultural)**, as in Rijnhuizen “a couple of people mentioned that one of the reasons that they bought this apartment, is that it is really ready for the future and it gives them a good feeling to live such a sustainable life” (R10). The need to live in a **liveable environment (social-cultural)** can also contribute to this.

Interventions

To address the abovementioned barriers and drivers, a **legitimate** governance approach seems most suitable, as this phase is mainly about defining the problem, which has to happen based on the right information that has to be communicated in the right way. The platform that has been set up is a good start, but likely only people that are already interested in climate adaptation

will use that. Therefore other communication methods have to be sought. As such, **everyone** can participate and they **listen as a spectator** and gain **personal benefits**, being the knowledge, which can be used in a later phase. Information can be dispersed by clearly indicating the vulnerabilities in the area, telling tenants they are allowed (and encouraged) to complain to their landlords or publicity on what the municipality has done, to show that they are taking this seriously. Furthermore, as many citizens do not know what climate adaptation means and *“it is a term we should not use in conversations... it is fine for people that are working on it, but it is jargon”* (R10), another word like ‘liveable environment’ could be used instead. This likely applies more to the daily life of citizens and *“ties in with what is considered important for people”* (D2).

Planning

Barriers & drivers

When it comes to developing, assessing and selecting options, several barriers arise for citizens. First of all, there seems to be a big **knowledge gap on measures (informative)**. For example, *“greening an area is not directly associated with reducing heat”* (D2), but it is also unclear what different solutions entail. *“If you do not know what plant to put in the ground, then it is over”* (R2). This also ties in with the fact that citizens sometimes only see **drawbacks of measures (technical)**. For example, a tree needs space, requires maintenance and blocks the sun. furthermore, green areas often do not survive winter due to a *“lack of knowledge of and time for green and maintenance”* (D2).

At the same time, citizens recognise the many advantages climate adaptive measures can bring. They mention for example the **aesthetic value (social-cultural)** of a green area, which has become even more important in this time when many people work from home. *“They look out on their roof and think, that could actually have been green, then I would have had something nice to look at”* (R1). Also **saving water (resources)** is an advantage, which in a period of drought can be convenient. Furthermore, climate adaptive measures contribute to a **liveable environment (social-cultural)** and it can help **reduce or prevent damages (resources)** to the house. In addition, the fact that many climate adaptive measures are relatively **easy solutions (technical)** can also work as a driver to start developing options.

However, **personal beliefs (social-cultural)** can still act as a barrier to not do so. Many citizens believe that they can only play a small role in e.g. preventing damages and that it is mainly up to the government and water managers to act upon this. These **unclear responsibilities (political)** prevent them from taking action.

Interventions

Because of the many advantages people see in climate adaptive measures, it is important for the municipality to respond to this. This can be done by a **participatory** governance approach, where the municipality participates in what is happening in society. As such, the participation is **open, but self-selected**, meaning that the municipality decides on what initiatives to engage in. They can **develop preferences** and **advise or consult** the citizens, based on their existing knowledge and experience in this field. They can provide a list of options of easily implementable climate adaptive measures, similarly as is done with the plant list of SDN. Furthermore, they can try to respond to the right moments, for example when people move or when they hire a gardener. Also, a conversation with local gardeners, to emphasise the need for green spaces in the municipality, could potentially prevent people from filling their garden with tiles.

Managing

Barriers & drivers

In the last phase, there is one main barrier, being a **lack of time (resources)**. The implementation, but especially the maintenance, of a climate adaptive measure, is expected to be time-intensive. On the other hand, citizens still recognise that there are also many **easy solutions (technical)** that require less time. Furthermore, the **aesthetic value (social-cultural)** of the solutions continues to play an important driver in this phase.

Interventions

To support citizens in this phase, the municipality can choose a **network** governance approach. Here the participation can be **open, but self-selected**; only the interested citizens will engage. They have the opportunity to **deliberate and negotiate** with the municipality about the stages in this phase and **co-govern** the solutions. The implementation will mainly be done by the citizens themselves, but the municipality can provide support especially when it takes place in the front gardens or on the street. The municipality can also provide a guideline with clear steps for maintenance. Furthermore, the municipality has to provide support in the monitoring and evaluating stages. The citizens can also engage in this, for example through citizen science. If the monitoring and evaluating are done correctly, it can give citizens a more clear picture of what the advantages of climate adaptive measures are, which can be shared on e.g. the platform.

6.2.3 Real Estate Developers

As the two interviewees of this stakeholder group work for real estate developers that differ in size, they also act differently upon climate adaptation. The freelancer that works for small real estate developers mentioned that *“they [government, ed.] create a policy, and we will see if we can implement it”* (R11). However, if it turns out that certain aspects are not possible, that should also be fine. This is not to say that they do not care about it, but they carefully weigh the pros and cons. Furthermore, together with a real estate developer, he developed a system with which they can build almost energy neutral buildings and at the same time adhere to the policy framework of Rijnhuizen. BPD, the bigger real estate developer, has a lot of capacity and has therefore set up its own sustainability strategy, including energy, climate, mobility and circularity as main topics. Although this strategy is developed at the corporate level, the four pillars are used within projects. Furthermore, the interviewee indicated that *“nowadays we take care of the whole area... within that area, we organise everything, from the streetlights to the park, to benches and the houses”* (R14). By doing so, there is more space to implement climate adaptive measures. Below per phase, the adaptive governance framework is applied, which is also visualised in Figure 6-4.

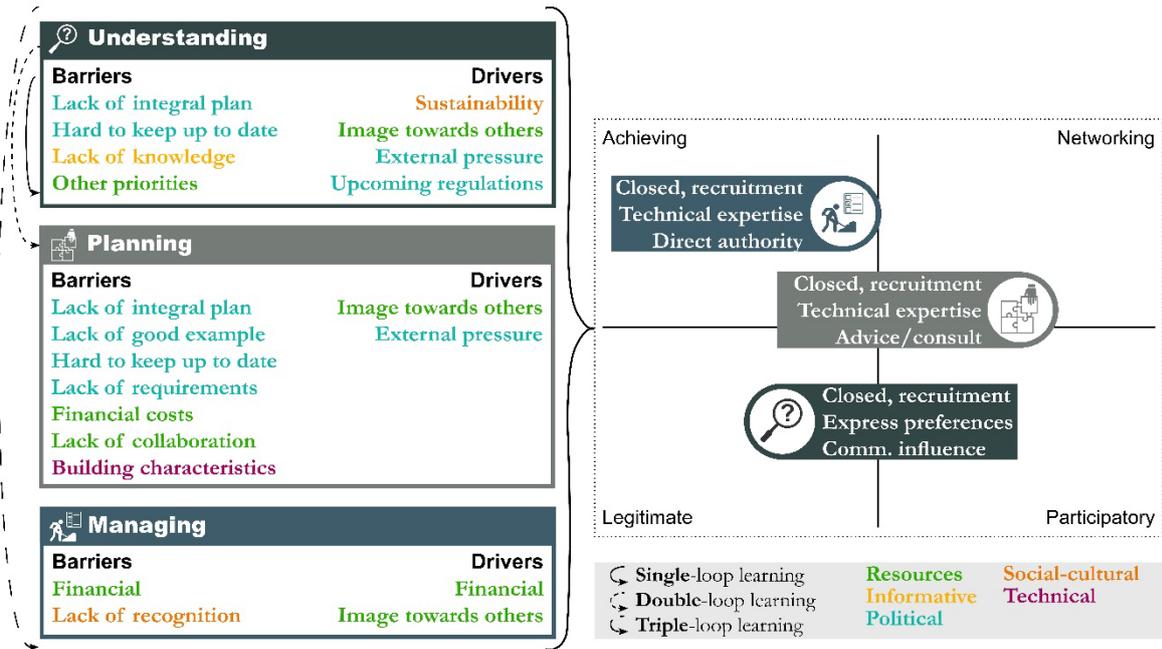


Figure 6-4. Adaptive governance for real estate developers

Understanding

Barriers & drivers

When the real estate developers are developing new buildings in Rijnhuizen in Nieuwegein, they have to adhere to municipal policies (on climate adaptation, but also within other domains) as well as the policy framework of Rijnhuizen. As a result, they feel that often an **integral plan is lacking (political)**. Especially since they all also work within other municipalities, they find it **hard to keep up to date (political)** with all the different documents, even though they mention that often these documents are not regularly renewed and therefore often outdated. Consequently, they do not have a clear picture of where problems could potentially occur. This **lack of knowledge (informative)** on climate adaptation can also be a result of them having many **other priorities (political)**. Already there are many problems to be solved when developing a new area, and when looking at sustainability, energy neutrality often plays a much bigger role than climate adaptation at the moment.

However, at the same time, they want to do *“things right from the start”* (R11). This **striving towards sustainability (social-cultural)** is embedded in for example the sustainability strategy that was set up by one of the real estate developers, who also indicated that by doing so they want to *“be one step ahead of the others”* (R14). This does thus not only come from an intrinsic motivation of doing the right thing, but also because they believe it will enhance their **image towards others (resources)**: *“On the one side towards clients, thus the municipalities, but on the other side also towards the consumers”* (R14). They feel that in this stage especially the municipality puts **pressure (political)** on the real estate developers, and expects them to consider climate adaptation. Lastly, they also know that **regulations (political)** might come in place at some point and they want to be prepared for that moment.

Interventions

To act upon these barriers and drivers in the understanding phase, the municipality should take a **legitimate** governance approach. The focus should be on providing the real estate developers

with knowledge on the vulnerability of the to be developed area, for example using the vulnerability tests, and an integral vision, which also includes argumentation on why certain aspects are important, in a specific area. However, the municipality should here consider the already existing vision of the real estate developers, and use aspects of that if possible. By doing so, the real estate developers can **express their preferences** and have a **communicative influence** on what the municipality is providing them with. As all real estate developers have to engage with the municipality when they want to develop, the participation is **closed, with targeted recruitment**.

Planning

Barriers & drivers

The second phase, concerning the development, assessment and selection of options is where many real estate developers are at the moment, and as a result, most barriers occur in this phase. The **lack of an integral plan (political)** persists as a barrier and becomes even stronger. The real estate developers mention that there are *“requirements that are contradictory”* (R11). For example, if a climate adaptive measure interferes with the esthetical value of a building, a trade-off has to be made. Also, energy measures are still favoured over climate adaptive measures. Moreover, the *“parking norms of the municipality are an eyesore”* (D3) as they use up big areas that could be used for green spaces. This feels like a **lack of a good example (political)** from the municipality. Furthermore, because every piece of policy is individually looked at, it is hard to have an overall picture of the requirements and it is even **harder to keep up to date (political)** with all the different policies. As a result, they also experience a **lack of concrete requirements (political)**: *“when do we fulfil the wishes of the municipality?”* (R14). Especially real estate developers with less expertise in this field ask for a set of tools as support in this phase of the process. However, they also acknowledge that setting requirements could complicate the process, as the projects are highly contextual.

Financial costs (resources) also start playing a role, since *“it does not make it cheaper”* (R14). Although certain measures can result in a financial benefit, it is hard to prove this in this phase. Besides, the potential financial benefit does not necessarily go to the real estate developers, due to the financial construction of who buys or invests. Another barrier that exists in this phase, is a **lack of collaboration (resources)** between real estate developers. They acknowledge that *“aligning their development to surrounding projects could be useful”* (D3), for example, to create green connecting strips, but do not know how to do so. Lastly, **building characteristics (technical)** can act as a barrier, especially when developments happen with limited space surrounding the plot or when high buildings are built.

On the other hand, the **image towards others (resources)** becomes an even more important driver in this phase. When options are being selected, this is done with the clients and consumers in mind. For example, when applying for new projects, they have to showcase existing projects and respective achievements. Furthermore, the **pressure (political)** from society increases. Consumers do not only value a green neighbourhood, but they also start asking for it. Furthermore, banks and investors are showing more interest in climate adaptation, which is passed on to real estate developers.

Interventions

With these barriers and drivers in mind, a **network** governance approach seems most fitting. Setting up an integral plan with concrete requirements seems to be the most pressing issue, where the existing knowledge and expertise of the real estate developers should be integrated. This should not only cover climate adaptation, but also other aspects of sustainability and other issues related to development. In doing so, the real estate developers are still in a **closed, but**

targeted participation, where they give **technical expertise** by **advising/consulting** the municipality. For example taking an integral approach of the plot that also takes into account the surrounding area, as done by some real estate developers, can be a piece of good advice from the real estate developers to the municipality. Another piece of advice from the real estate developers is to keep such a plan up to date and keep track of lessons learnt. At the same time, it is important to always “*keep looking at the individual projects to find out what is possible*” (R11) and to realise that a blueprint is not desirable. A suggestion of one of the real estate developers is to set up a set of requirements and give real estate developers the freedom to choose a minimum amount of requirements from that list. In that way, flexibility is combined with concrete requirements. To stimulate collaboration between the real estate developers, one of the requirements could be to realise a climate adaptive measure, e.g. a green space, together with a surrounding plot.

Managing

Barriers & drivers

Just as in the previous phase, **financial costs (resources)** play a big role in the last phase. Next to the financial cost of implementing the measures, also the need to prove that a building fulfils certain requirements costs a relatively large amount of money. On the other hand, in this phase, the **financial benefits (resources)** of climate adaptive measures are becoming more clear. Especially when the buyer has a long-term vision, it can be financially beneficial to create a climate-resilient building and surrounding. Furthermore, there are more and more financial constructs that make it favourable to buy or invest in sustainable housing. As said by one interviewee, “*there are financial stimulants to do it and when you calculate what a house actually costs in the use phase, it is always a smart plan*” (R11). However, this long-term vs. short-term thinking is not yet translated into many bureaucratic processes.

A second barrier in this phase is a **lack of recognition (social-cultural)**. Some real estate developers and projects are ahead of the others but do not see proper recognition for their work. Of course, this can be translated somehow in an improved **image towards others (resources)**, especially when the real estate developers can prove that they are striving towards sustainability. Furthermore, it is an added value in their portfolio, specifically when clients with a long-term vision look at it.

Interventions

An **achieving** governance approach seems most suitable, where the market can correct the barriers and make use of the drivers. In this way, the real estate developers are still in a **closed but targeted** participation with **technical expertise** as in the previous phase, but now they have **direct authority** on what they are doing, which is steered by the market. For example, by creating a rewarding system for excellent projects, where both the process and outcome were of high quality. Also, partnerships with real estate agents in the municipality could be a good idea, because attention can be paid to not only show the costs of a house now but also the sustainability and efficiency in the long term. A ranking system could potentially help indicate this.

6.2.4 Commercial Real Estate Owners

The commercial real estate owner that was spoken to for this research, Wereldhave, is the owner of a big shopping mall in Nieuwegein. Recently, Wereldhave developed a sustainability strategy, where climate adaptation is one of the three pillars, next to (carbon) footprint and social sustainability. At the moment, they are setting up integral sustainability plans for each of their buildings, to understand better what measures can be taken to make them more sustainable.

Furthermore, they aim to make a scan of all their roofs, to see what the possibilities for green spaces are. Below per phase, the adaptive governance framework is applied, which is also visualised in Figure 6-5.

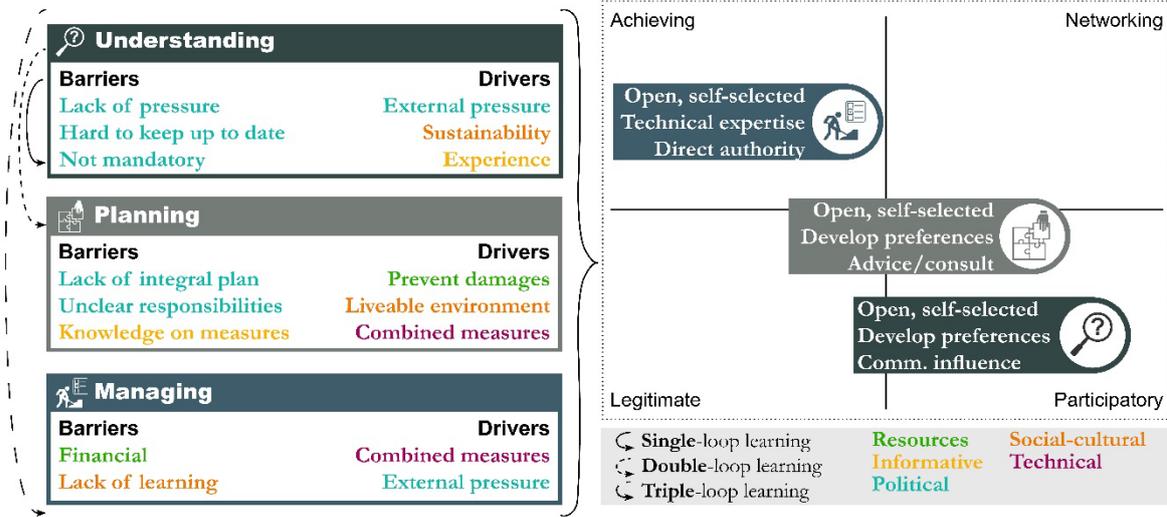


Figure 6-5. Adaptive governance for commercial real estate owners

Understanding

Barriers & drivers

In the understanding phase, several barriers and drivers exist for commercial real estate owners. First of all, there is **not much external pressure (political)** from the municipality to take climate adaptive measures, and if “*nothing comes from the municipality, then it disappears again*” (R6). At the same time, however, there is a lot of **external pressure (political)** from investors and banks. As said by the interviewee, “*I feel it more with them than with the government*” (R6). When banks or investors see that a building is situated in a flood-prone area or within a UHI, they ask questions about it. As a result, almost all institutional real estate owners, being the ones that have investors or the ones that are listed on the stock market, have started working on climate adaptation. This is also stimulated by several benchmarks, where many commercial real estate owners participate.

Furthermore, because many commercial real estate owners operate in multiple municipalities, they find it **hard to keep up to date (political)** with the vulnerabilities in each area. This is further strengthened by the fact that taking climate adaptive action is **not mandatory (political)** at the moment, “*it is too non-committal*” (R6).

On the other hand, many commercial real estate owners, especially the one that was spoken to for this research, **strive towards sustainability (social-cultural)**. Wereldhave aims to “*help people with a better everyday life and that, of course, does not include us being some kind of heat island ... or the surrounding area being an unpleasant living environment*” (R6). In the end, it is about the well-being of the visitors, employees and community surrounding the shopping mall. When it turns out that a building does contribute to the creation of e.g. a heat island, as was the case with one of their buildings, this **awareness (informative)** can be a driver to start acting upon it.

Interventions

As there is currently no relationship between the commercial real estate owners and the municipality, a **participatory** governance approach fits well in this phase. The municipality can support this stakeholder group by actively handing out information about the vulnerabilities and add on the already existing pressure from banks and investors. The representation of the municipality to engage with the real estate owners is **open but self-selected**. The municipality could for example approach the sustainability managers of these stakeholders and support the ones that are interested by **developing preferences**. In doing this, the municipality can have a **communicative influence** on what the real estate owner is aiming for. In this way, the already existing energy within the organisation can be used as a catalysator for the next phases. Wereldhave also suggested that often they have an empty space for a few months, which could be temporarily given to the municipality. Here they could set up an exhibition to show the urgency of climate change, which will increase awareness also with the local shops and visitors of the mall.

Planning

Barriers & drivers

When it comes to developing, assessing and selecting options, a **lack of an integral plan (political)** plays as a barrier. Wereldhave is currently setting this up, intending to have a clear idea of where they are going with regards to sustainability. This can also help overcome the barrier of **unclear responsibilities (political)**. First of all, there are of course tenants that have a certain responsibility, but this is not clear at the moment. Secondly, when a building is situated close to other buildings, for example, a shopping mall with apartments on top, it is not always clear who is responsible for what. Another barrier can exist in a **lack of knowledge (informative)** on climate adaptive measures. For example, questions arise on what is possible on the roof and how much weight the roof can handle. Also, knowledge of existing subsidies is limited, making it hard to make use of them.

Preventing damages (resources) on the other hand can be a driver to start acting upon the problems. *“With climate adaptation, it is of course that if you do not do anything, you will experience the heat, and that will really bother you”* (R6). Especially compared to energy consumption or CO₂ emissions the effects of climate change are much more tangible. When aiming to create a **liveable environment (social-cultural)**, this can push commercial real estate owners to take action. Furthermore, if climate adaptation can be **combined with other measures (technical)**, such as building a playset outside while greening the square, *“it is a win-win”* (R6).

Interventions

In this phase, it is likely that still, a **participatory** governance works best. The municipality can continue to support the commercial real estate owners by discussing responsibilities or potentially set up a plan together if the problem lies in a shared space, such as the sidewalk next to the shopping mall. The representation of municipality is still **open, but self-selected**, meaning that they will focus their energy on the ones that are interested in taking climate adaptive action. In doing so, the municipality will **develop preferences** and **advise and consult** the real estate owners, based on their experience with the topic. For example, the inspiration book by the municipality can be used to show examples of measures. Also, barriers should be discussed with the municipality, so they can potentially be prevented or overcome.

Managing

Barriers & drivers

The main barrier in this phase is the **financial cost (resources)**, as there is currently no business case for taking climate adaptive measures. If, for example, the commercial real estate owner

implements a green roof, it will likely have a positive influence on the tenant who has to cool less in summer: *“The tenant then has a financial advantage, but we implemented the green roof, so it cost us money. And you do not see that in the prices of the rent.”* (R6). Also with water retention, there seems to be no financial benefit, *“unless the water board pays stakeholders for the water retention... or the other way around in a discount on the sewage tax”*. (R6). Furthermore, the value of the property is not likely to increase immediately, if that ever happens. On the other hand, if climate adaptive action can be **combined with other measures (technical)**, for example, a renovation, the financial cost can be mitigated.

Another barrier is a **lack of learning (social-cultural)**, which can be seen in the fact that many projects stay within an experimentation phase: *“It often stays a pilot, but we need to get out of the pilot and have proven concepts, so we can roll it out”* (R6). They also see this on the side of the municipalities, who are new to this way of working with stakeholders.

However, the **external pressure (political)** from the banks and investors continues to play a role in this phase, especially when it comes to monitoring and evaluating. The benchmarks that were mentioned earlier encourage the commercial real estate owners to not just implement, but also to monitor the effects of that implementation.

Interventions

An **achieving** governance approach seems to work best in this phase, to tackle the main barrier of financial costs and use the external pressure from other market players. For example, a subsidy could help, but also benchmarks that are in the market play a big role. As the market is open to everyone, the representation of the commercial real estate owners will also be **open, but self-selected**, meaning that only the interested ones will participate. Their communication remains **technical expertise**, where the communication will take place via the market, and they have **direct authority**.

6.2.5 Companies and Business Parks

Per company it differs what they are doing within the field of climate adaptation. Some companies have climate adaptation high on their agenda, whereas others have hardly ever heard of climate adaptation. For example, the business park in the neighbouring municipality is doing a project to green their business park, whereas the hospital has thought of these things, but has not made anything concrete yet. Within the entrepreneur group, it did not seem to have made the agenda at all yet. Below per phase, the adaptive governance framework is applied, which is also visualised in Figure 6-6.

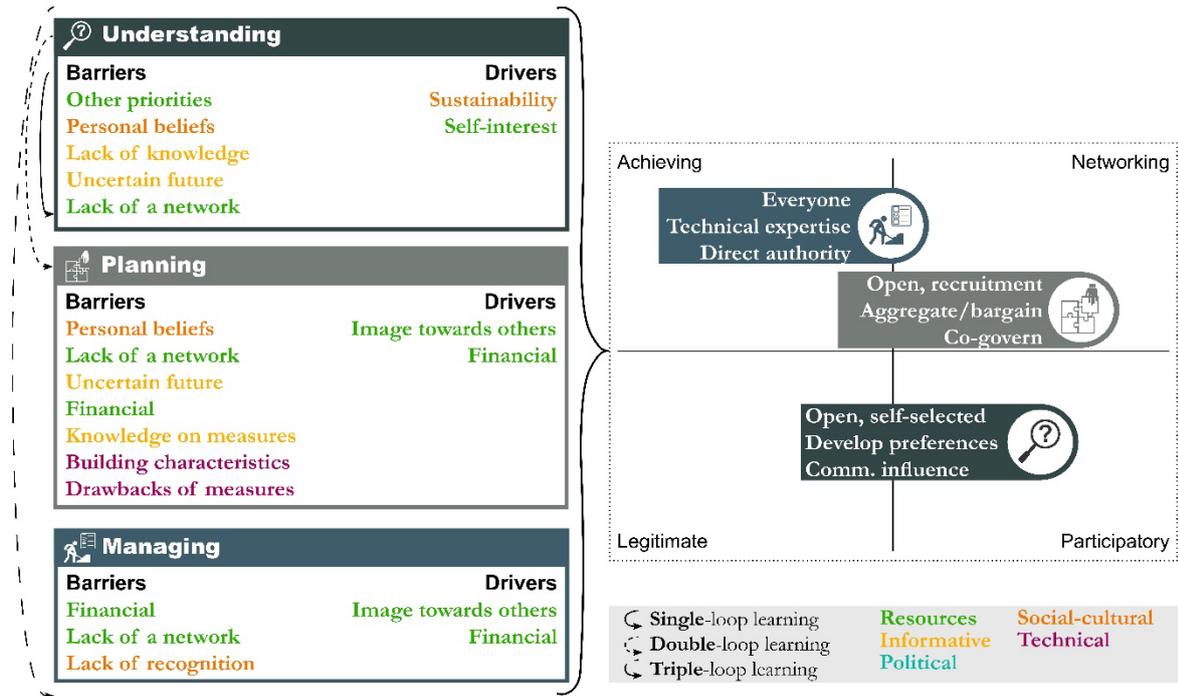


Figure 6-6. Adaptive governance for companies and business parks

Understanding

Barriers & drivers

A first barrier that companies and business parks encounter when entering the process of climate adaptation, is that they have many **other priorities (political)**. For example, the hospital said: *“We get money to place band-aids and not to cure the earth”* (R13). Another interviewee mentioned: *“I think it is important, but on the other hand, I have a company to run”* (R9). Especially during the COVID-19 pandemic, several companies are already having a hard time, and trying to survive is their main goal. This is further strengthened by the fact that some people have strong **personal beliefs (social-cultural)** on this topic and are not convinced by the urgency of it, which could also relate to a **lack of knowledge (informative)** on climate adaptation. Lastly, some companies mention an **uncertain future (informative)** as a barrier. They are for example not sure about whether they will move somewhere else soon. As such, they do not find it worth to start thinking of climate adaptation. Especially companies situated in Rijnhuizen have this problem since they have the idea that the whole area will be transformed into a living area, with no space for businesses. When it comes to business parks, there is another major barrier, which is a **lack of a network (resources)**. Because there is currently no established park management on any of the business parks in Nieuwegein, it is hard to get those companies together to start the process.

Many companies, however, are starting to think about **sustainability (social-cultural)**, since Corporate Social Responsibility (CSR) is playing an increasingly important role. *“They strive to sustainability, climate adaptation is part of that”* (R8). Furthermore, some companies can get some value out of motivating others to start thinking about climate adaptation. For example, a company that sells green roofs can act from a **self-interest (resources)** point of view and even get new affairs out of it.

Interventions

To respond to the barriers and drivers, the municipality can opt for a **participatory** governance approach. The main reason for this is because in that way they can focus on the companies that are already interested and support them to become frontrunners in the movement. Within the companies, they can even look for people that are passionate about this topic and facilitate them in getting their organisation into action. Here they can align with the already existing vision of the company. In doing so, the municipality engages **openly, but self-selected**, they **develop preferences** and have **communicative influence**. They can, for example, support the setup of a park management, to facilitate communication not only about climate adaptation but also on other (sustainability) topics. In that way, the municipality can vouch for the potential advantages of having such a park management. However, it should be up to the companies on the business parks to fill in what a park management should entail exactly.

Planning

Barriers & drivers

In the second phase, **personal beliefs (social-cultural)**, the **lack of a network (resources)** and an **uncertain future (informative)** remain important barriers, but also new barriers arise. **Financial costs (resources)** start to play a role because the potential solutions must be financially feasible for a company, and many companies believe this is currently not the case. This can also be because the companies have a **lack of knowledge on measures (informative)**, including potential subsidies. Furthermore, they might be aware of the risk of water nuisance, but they do not know what they can do about it: *“Then the question is, how do you implement a green space on and around a hospital?”* (R13). This is further complicated by the fact that for certain companies, the **building characterises (technical)** make it hard to take climate adaptive measures. For example, *“a storage place needs asphalt in front of it because trucks need to be able to drive around without problems”* (R8). Also when buildings are very tall, with only a small area around them, it can be complicated to find space for climate adaptive measures. Lastly, depending on the type of company, there can also be **drawbacks to measures (technical)**. The hospital, for example, mentioned that they can *“increase biodiversity by planting flowers in our grass, which is really nice unless insects and bees come inside. We do our best to keep everything that flies out of the building, so we will definitely not lure them close to the building”* (R13).

There are also some drivers for companies in this phase. They recognise that solutions can lead to an **improved image towards others (resources)** and in that way *“it indirectly pays itself back”* (R8). As such, there can be a **financial benefit (resources)** with climate adaptive measures, especially when looking at the long-term.

Interventions

In this phase, a **network** governance approach seems appropriate to enhance stakeholders to develop, assess and select options. By bringing companies together, especially with a few frontrunners, they can inspire each other on what actions to take. As said by one interviewee: *“Put a group together and in the end, everyone can say something about it”* (R9). Furthermore, they can even think of setting up some actions together when companies are situated next to each other. By doing this and looking at the processes of the companies, symbiosis can be developed and as a result, the financial costs can be mitigated. The municipality, or another governmental body, can also give free advice based on their experience and knowledge, taking away another financial barrier. This is already done by the waterboard HDSR. This advice can be done in person for a specific area, but also in the form of an inspiration book focussing on e.g. industrial solutions. In doing so, the municipality can set the network **open, with targeted recruitment**, meaning that they try to tie in with frontrunners, but it is open to everyone else. The companies can **aggregate and bargain** on the potential solutions, and **co-govern** with the municipality.

Managing

Barriers & drivers

In the managing phase, **financial costs (resources)** are still playing an important role, since the measures will have to be implemented in practice, monitored and evaluated. However, as also mentioned before, indirectly the measures can pay themselves back by for example **improving the image towards others (resources)**. As such, with multi-functional measures, there is a **financial benefit (resources)**.

Besides financial costs, also the **lack of a network (resources)** continues to exist as a driver. A network can not only support ideas and combine capacities but also help with addressing the **lack of recognition (social-cultural)** through for example a benchmark. Especially for SMEs, these benchmarks are not present.

Interventions

To overcome these barriers and make use of the drivers, the municipality can choose an **achieving-network** approach. On the one hand, they can focus on the market, for example by providing financial stimulants or by supporting some type of benchmark. However, a network is needed to set up such a benchmark, which could happen for example on the already existing platform. As such, companies can get public recognition for their work. Recognition can also be addressed by providing frontrunners with small advantages, related to their affairs. This can be open to **everyone**, as everyone can or will take part in the benchmark. The companies can provide **technical expertise** and exert **direct authority**, especially when it comes to the actual implementation of the solutions.

6.2.6 Schools

Within the school foundation, no actions on climate adaptation have taken place yet. There have been some small thoughts about it, but for several reasons, that will be explained in the following section this was never pushed through. Below per phase, the adaptive governance framework is applied, which is also visualised in Figure 6-7.

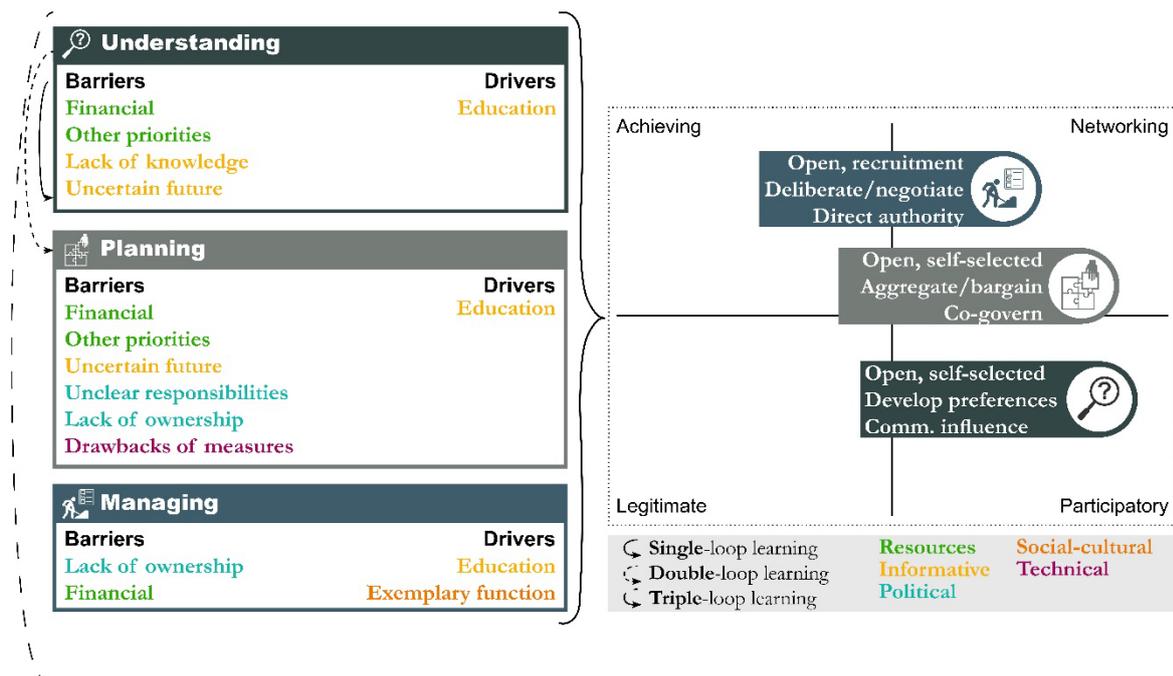


Figure 6-7. Adaptive governance for schools

Understanding

Barriers & drivers

The main barrier for the school foundation to start thinking about climate adaptation is that they do not have the **financial (resources)** means to do so. This is partly because of **other priorities (resources)**, being education, but also because of a general lack of funding in the public school sector. As such, all available money is used for their main task, and everything else is considered not important enough.

Furthermore, **knowledge on climate adaptation (informative)** is missing, as the school foundation does not know where vulnerabilities lie and mainly talks about other aspects of sustainability, such as energy neutrality. Additionally, because of a plan to move all the schools between 2015-2030, even though no relocation has happened yet, the school foundation is **uncertain about the future (informative)**. As a result, they do not want to think about climate adaptation in their existing buildings, because they will be moving anytime soon. A driver for schools to start thinking about climate adaptation is the **educational aspect (informative)** of it as it can be used in the educational program. It seems important to discuss this topic with the students.

Interventions

To support the schools to start thinking about climate adaptation, a **participatory** governance approach would be best. In this way, the municipality can help the interested schools, but that see too many barriers. As a result, the participation would be **open, but self-selected** for the municipality. The municipality can help **develop preferences** and can exert **communicative influence** on what the schools are doing. For example, providing schools with a vulnerability overview, and what implications that could have on the health and concentration of the students. They could also support the schools in finding financial support outside of the municipal budget. By supporting them in this way, they give the schools the possibility and time to create ownership of the problem. The change will come slowly, the municipality just needs to provide the right stimulants.

Planning

Barriers & drivers

The barriers of **financial cost (resources)**, **other priorities (resources)** and **uncertainty about the future (informative)** persist in this second phase. Furthermore, the school foundation indicated that there are **unclear responsibilities (political)** as the buildings are owned by the municipality, but managed by the school foundation. Big renovations are the responsibility of the municipality, but small maintenance is for the schools. When it comes to for example assessing the potential implementation of a green roof, it is unclear whether that would be considered renovation or maintenance. Furthermore, the **lack of ownership (political)** of the schools and the playgrounds is a barrier to potentially invest in climate adaptation. It was mentioned that two playgrounds that are owned by the school and that are surrounded by a locked gate are much greener than public playgrounds of the schools. Another barrier is the **drawback of measures (technical)**. Not everyone likes green playgrounds, as the children might get dirty. This is a drawback not only for the school but also for parents who could complain if their children come home dirty.

At the same time, the **educational aspect (informative)** becomes stronger as a driver. When developing, assessing and selecting options, it would be interesting for children to participate in this process and learn from it.

Interventions

To respond to these many barriers and one driver, a **network** governance approach seems most suitable. In this approach, the process can be **open, but self-selected** and the schools can **deliberate and negotiate** on the potential solutions. This can be done while **co-governing** with the municipality. First of all, the municipality can provide more clarity regarding responsibilities and the potential move of the schools. Furthermore, the focus can be on easy solutions, that can potentially be transferred to the new location or used by the next user of the building. Additionally, an educational tool to design a green-blue playground together with students can be useful.

Managing

Barriers & drivers

In this phase, no new barriers arise. The **lack of ownership (political)** of the building can complicate the implementation, as well as the monitoring and evaluation. Furthermore, **financial costs (resources)** still play a role.

A new driver however emerges. Next to the **educational aspect (informative)**, where the implemented climate adaptive measure can be used to educate children about climate adaptation and climate change in general, also the **exemplary function (social-cultural)** of a school becomes a driver. For example, a green roof can add to that exemplary function.

Interventions

In this last phase, the municipality can work together with the schools in a **network** governance approach to implement, monitor and evaluate the solutions. The schools can **deliberate and negotiate** about how it should be done, but maintain **direct authority**, since they are the users of the building. The participation is **open with targeted recruitment**, to focus on the schools that are already this advanced. Financial support can be provided through the municipality or an external fund and publicity to enhance the exemplary function of the school can be facilitated on for example the platform.

6.2.7 Governmental Bodies

The governmental bodies have mainly taken the lead in climate adaptation in the past years. The municipality started working on climate adaptation in 2014 after a declaration of intention, in which also the water board participated. As climate adaptation was a new field, the municipality, or more specifically, one person at the municipality had to figure out himself how it all worked. However, there was political support to do so, which cannot be underestimated. Together with the region a coalition spatial adaptation was set up, *“to understand what the theme is about, where we have to pay attention and what we are going to do”* (R1). It was a *“doing by learning”* (R1) approach. In 2018 the municipality set up a vision and agenda on climate adaptation, for which they asked input from several stakeholder groups in the municipality through a survey (for citizens), interviews (with e.g. a high school, a data centre, SDN and Portaal) and a focus group (with governmental bodies such as the province, the waterboard and the safety region, as well as the hospital, Mitros and two consultancies). These different forms of participation were useful to understand the views of different stakeholders on climate adaptation but were not meant to give the stakeholders a lot of authority in the decision-making process. They also did not lead to any long-term engagement of stakeholders. After the development of the vision and agenda, the

municipality started to take concrete actions. For example, every year an action in collaboration with the gardening centres takes place, which is supposed to stimulate people to green their garden and house. Moreover, they try to “think with companies, with real estate developers and with social housing associations” (R1). Currently, they are setting up a pilot for front gardens in ten different places in Nieuwegein and a pilot to green sidewalks is currently on the way. They also set up a networking platform for climate adaptation at the end of 2020.

The water board has also been very active in climate adaptation. Next to assisting the municipality in setting up the vision and agenda, they for example advise on how to deal with water issues in new spatial developments and are setting up guidelines for the building industry together with other groups. Furthermore, they work together with all the municipalities in the region on this topic. Lastly, the safety region was interviewed. Compared to the other two governmental bodies, they are not as advanced, as they are “currently looking at what we as safety region want on climate adaptation as policy” (R12). At the moment, the safety region is more focused on the process that comes after a disaster happens, rather than trying to prevent disasters, but this is slowly changing. Below per phase, the adaptive governance framework is applied, which is also visualised in Figure 6-8.

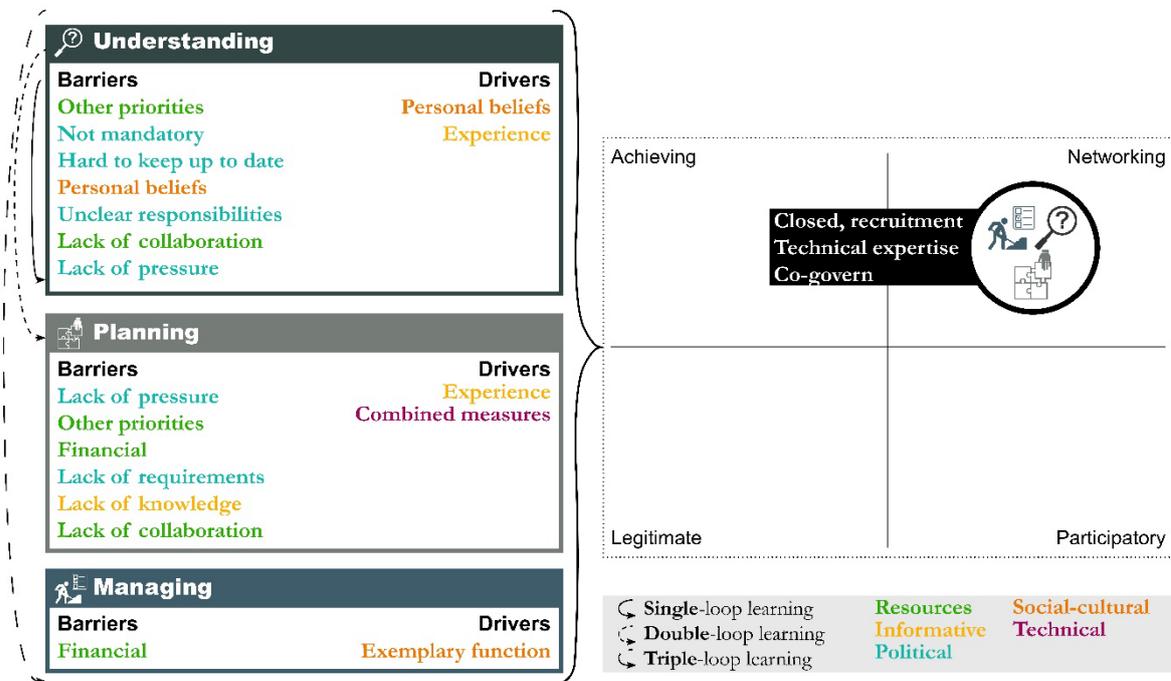


Figure 6-8. Adaptive governance for governmental bodies

Understanding

Barriers & drivers

A first barrier for governmental bodies to work on climate adaptation is that there are many **other priorities (resources)**. For example for the safety region, “climate change is just one of the many disasters that can happen” (R1), and it is a rather abstract one. Also, climate adaptation is more abstract than climate mitigation and therefore receives even less attention. Especially now, “the COVID-19 pandemic pushes everything aside” (R12). Also within the municipality, there are limited resources to work on this topic, mainly because it is **not mandatory (political)**. As such, it is hard to keep the information relevant and to **stay up to date (political)**. “If you only do it [renewing

*the strategy] once every four years, you are not really up to date” (R12). Additionally, it depends a lot on **personal beliefs (social-cultural)** whether climate adaptation is put on the agenda. Within the municipality, there was one person who thought it was an important topic and therefore started to work on it. Similarly, within the safety region, it was mentioned that the team manager and the director have to see the added value of working on the prevention side of climate adaptation. At the same time, if there is someone within the organisation that has strong **personal beliefs (social-cultural)** on that climate adaptation is important, it can really accelerate the process and make the organisation move to the next phase.*

Moreover, the safety region mentioned **unclear responsibilities (political)** as a barrier, mainly because *“for other organisations, it is not clear what information we have” (R12)*, and thus also what the responsibilities of the safety region are with regards to that information. This is also due to a **lack of collaboration (resources)** between certain governmental bodies. The water board and municipality work closely together on various topics, but the safety region is a lot less connected, which can also be because they rather work on a regional level.

Lastly, the municipality does not experience a lot of **external pressure (social-cultural)**, from e.g. citizens. *“Nieuwegein does not have a tradition of green initiatives, there are only a few citizens that come to the municipality with the question to green the neighbourhood, in comparison to Utrecht or other municipalities” (R1)*. Similarly, the safety region does not feel any pressure from the municipalities. At the same time, all governmental bodies mention that they have **experienced (informative)** the effects of climate change in the last few years and that that is a driver to start acting upon it. As governmental bodies, they *“are of course facing the same challenges” (R7)*. 2018 had a very dry and hot summer and when the vision was established later that year, *“there was no one in the municipality that dared to question climate change” (R1)*. The water board did not mention any barriers in this phase, which is probably related to the fact that the topic is largely embedded in the nature of their organisation.

Interventions

Because the challenges that all organisations are facing are the same, a **networking** governance approach seems to fit most. The participation is **closed, with targeted recruitment**, meaning that the municipality should reach out to the governmental bodies that they think they need. At the same time, others governmental bodies, that are within the closed group, should also still be able to engage with the municipality. All participants can give their **technical expertise**, based on their experience. For example, the safety region has specific knowledge that can be shared with the other organisations. To do that, it has to become clear who is responsible for what and when that is established, the topic can be **co-governed** by all governmental bodies. Knowledge exchange within the organisations also plays an important role, to try to engage the entire organisation. If it is hard to find urgency within certain organisations, especially the ones that have other priorities, it is important to find the people that care about it, to have their personal beliefs play a role in putting the topic on the agenda.

Planning

Barriers & drivers

Similar to in the first phase, a **lack of external pressure (social-cultural)** persists in this phase. Also, **other priorities (resources)** remain a barrier to start developing, assessing and selecting climate adaptive measures. The capacity of an organisation, including both time but also **financial resources (resources)**, play an important role. For example, the municipality mentioned that they would like to have an additional person working on climate adaptation, but at the moment this does not fit the budget.

Although the municipality has set up a vision and agenda with some requirements, it remains hard to find **concrete requirements (political)**. The water board is experienced in issues related to water, but when it comes to heat and drought, they find it hard to make it more concrete. Similarly, the safety region mentioned that they are questioning how to advise in the future. When it comes to for example fire safety or hazardous chemicals, these issues are incorporated in national law, but this is not the case for climate adaptation, leaving many questions on what is the best thing to do. This is also related to a **lack of knowledge (informative)** on climate adaptive measures. Furthermore, the **lack of collaboration (resources)** on some of these topics makes it harder to select options. It must be said that a lot of collaboration is currently getting started at the regional level, with the development of a regional climate adaptation strategy and an online platform last year. However, this is still in the beginning phase.

Experiencing (informative) the effects of climate change still plays a role as a driver to start thinking of options in this phase. *“Those types of events create awareness and support to make a positive contribution. If you link that to concrete actions ... it becomes even more interesting.”* (R7). Furthermore, if climate adaptive measures can **be combined with other measures (technical)**, such as renovations, it drives the governmental bodies even more. Especially because the goal of becoming climate-resilient in the Netherlands only lies in 2050, it makes sense to focus on the low hanging fruits and to *“start where you think there are many chances”* (R1).

Interventions

Because the governmental bodies have a high potential to help each other in this phase, a **network** governance approach still seems most relevant. Also, the participation stays the same as in the previous phase, with a **closed, but targeted recruitment** group of participants, that give **technical expertise** to **co-govern** the topic. As such, it would be a good idea to align policies, also at a regional level, to *“further strengthen the existing collaboration”* (R7). In that way, it would be easier to know where certain knowledge is located, which can be passed on to the other organisations, and to find concrete requirements that can be translated into concrete actions. Because the *“translation to practice, that is the next step”* (R7). Furthermore, mainstreaming of climate adaptation becomes even more important, to engage all governmental organisations. Experimenting and breaking traditions can be a first step to do so. Although time and financial resources might seem like a big barrier for the governmental bodies, one of them mentioned that *“I think that is less important. I just pass this on to the organisation ... if we need to do this, this is the capacity we need... Then it is up to the organisation where they put their priorities”* (R12). As such, it is a matter of reallocating existing resources, rather than creating ‘new’ resources.

Managing

Barriers & drivers

Within the last phase, the main barrier for governmental organisations is the **financial costs (resources)** of implementing, monitoring and evaluating the options. *“It has to be realistic and financially payable”* (R7). At the same time, the governmental bodies know that they have an **exemplary function (social-cultural)** to the rest of society. This fact can act as a driver to take action and reflect upon through monitoring and evaluations.

Interventions

Also in this phase, a **network** approach, with the same type of participation seems most appropriate. As such, the participation is **closed, with targeted recruitment**, the governmental bodies still have their **technical expertise** and **co-govern** the topic. The municipality could for example make use of the platform that they have set up to make publicity about actions that

have been implemented and what can be learned from this. This will work as a good example for other stakeholders to know that the municipality is taking it seriously. Furthermore, monitoring could be done on the platform, to show what the effect is of actions taken by others. By taking a network approach, the financial costs could potentially also be mitigated, as the responsible stakeholder for an action can be appointed or a group responsibility can be taken.

6.3 General Barriers

Next to all the barriers that have been mentioned per stakeholder group, four barriers occur with almost every stakeholder group in almost every phase of the process. First of all, there is a **loss of knowledge (informative)** when for example people change roles or new people are hired. This could partially be mitigated by having proper documentation within the organisation, as well as when working with other partners. Secondly, **within every stakeholder group, there are differences (social-cultural)**. For example, with the real estate developers, *“some want to go full proof for sustainability, climate adaptation, whereas others say if we reach the norm, then that is also good for us”* (R10). Also, citizens have different personalities and beliefs and therefore *“the citizen does not exist”* (R10). People can be approached based on their norms and values: *“some are triggered by financial stimulants, whereas others are sensitive to values such as sustainability.”* (D2). As such, even within a stakeholder group, nothing can be generalised and there are different personal ambitions and need. It is important to recognise these differences when engaging with different stakeholders. This also ties in with the fact that in every group there are stakeholders that have a **lack of authority or decision-making power (political)**. For example, companies are sometimes not the owner of the building, but they rent it from someone else. *“This makes it complicated and less interesting to do something about the building”* (R8). The same can be said about citizens. Schools also lack that authority, but are in a way also part of the public organisation that owns the buildings, the municipality, making it a different relationship than companies and citizens have with their landlords.

Lastly, **bureaucracy (political)** acts as a big barrier and has been mentioned repeatedly by almost all stakeholders. It occurs in all phases and can lead to a delay in the whole process. It is visible in the fact that climate adaptation requires a new way of working, which does not always fit the existing policies and regulations. As such, *“if you want to do something new in the Netherlands, you run into a lot of rules”* (R11). Furthermore, within an organisation bureaucracy can delay processes. Especially with larger organisations, it can take a lot of time before decisions are made. Furthermore, it takes time for those decisions that are made at a corporate level to trickle down to a more local level. Part of this bureaucracy also concerns whether organisations have *“a long term or a short term vision on their development”* (R10). For example, a real estate developer mentioned that when looking at the long term *“climate adaptation is always a smart decision, but you only see it back in your wallet in 60 years and you do not know what costs you would have had if you would not have done it”* (R11). All these bureaucracy related issues work as barriers in the process of climate adaptation.

By taking an adaptive governance approach, where flexibility, participation and learning are central, this bureaucratic barrier can be partially overcome. Adaptive governance requires a change in mindset, where learning can lead to adaptive decision-making, meaning that (literally) nothing is set in stone. As a result, the decision or action can be adjusted when more information becomes available, which happens all the time. As one interviewee said: *“Back then our insights were more limited than what we know now ... insights change over time”* (R12). These insights can for example be gathered during the engagement with other stakeholders that have different points of view. With this flexible decision-making process, decision-making times can be shortened and a long-term approach can be applied, which better fits the needs of climate adaptation.

6.4 Concluding Remarks

As could be seen in the previous sections many barriers occur in different phases of the climate adaptation process. They vary in types of barriers, how often and when they play a role. Many of these barriers, however, can be partially overcome or even prevented by holistically applying the elements of the adaptive governance framework, where learning, flexibility and participation play an important role. This is further strengthened by the many drivers that have also been identified, varying in types and place in the process. Regarding the timing of the barriers and drivers, it was found that there are significantly fewer barriers and drivers in the managing phase than in the understanding and planning phase. An overview of all the identified barriers and drivers can be seen in Figure 6-9.

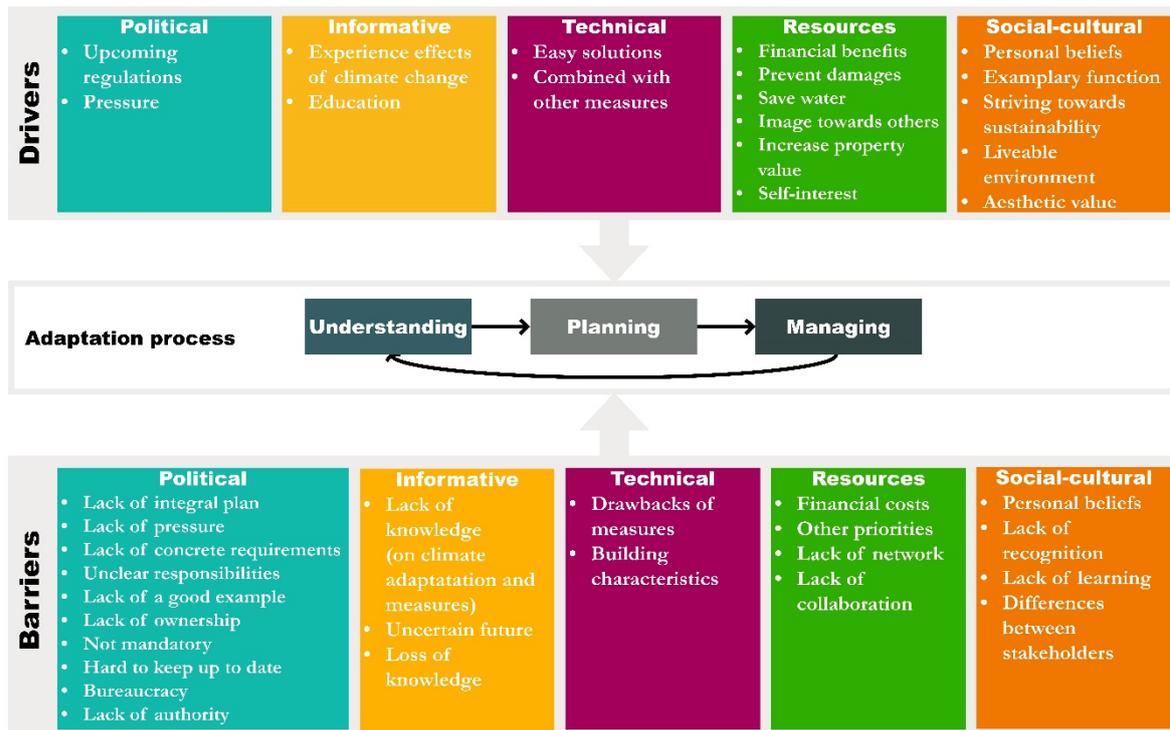


Figure 6-9. Barriers and drivers for stakeholders in Nieuwegein

A difference in barriers, drivers and adaptive governance approach however can be seen between the different stakeholder groups, which was a reason to split the stakeholders into groups in the first place. Although there are also some more common barriers, such as the ones mentioned in *section 6.2.8*, but also other priorities, financial costs and lack of knowledge that have been mentioned by many stakeholders at some point, it is important to not generalise the stakeholders because of these commonalities. It is not just money or knowledge that is missing it is rather a combination or accumulation of all the barriers and drivers that have been found in a certain phase. As said by one interviewee: *“They are all barriers in the customer journey, where at a certain point people simply give up”* (R2). Therefore, it is of high importance to staying focused on the individual needs and requests, that differ between, but sometimes also inside, of the stakeholder groups. For example, the types of drivers differ per stakeholder group. With citizens, the drivers that are mentioned are mainly social-cultural, whereas for companies and business parks and real estate developers they are mainly resource-based. Also, when looking at the specific barriers differences can be seen. For example, project developers are seeking more concrete requirements, whereas citizens and social housing associations do not have that need. Additionally, there is a difference in how stakeholders perceive the challenges. Some stakeholders see water as easier to deal with (e.g. the water board or the safety region) whereas

others think heat is an easier challenge (e.g. commercial real estate owners or social housing associations).

Because of these differences, adaptive governance has been applied in various ways to different stakeholders demonstrating that there is no one-size-fits-all approach. Often collaborative governance approaches are seen as the ideal way to govern climate adaptation or handing out a subsidy is expected to be the solution, but the results show this is not necessarily the case as not just resource-based or social-cultural barriers and drivers are listed. Also informative, political and to a lesser extent technical barriers and drivers play major roles. Therefore, it is the mix of different governance approaches and participation methods combined with learning that will likely be most successful in overcoming or preventing barriers and optimising the use of drivers. As a result, this is the way forward to stimulate stakeholders to implement local climate adaptation strategies.

7 Discussion

This chapter starts with a discussion of the findings in *section 7.1*. In *section 7.2* recommendations for practitioners, being municipalities, intermediary organisations but also the stakeholders themselves are given. Furthermore, the academic contribution of this work, translated into research gaps that have been addressed as well as the identification of new research gaps, is presented in *section 7.3*. This is followed by *section 7.4* that discusses the limitations of this study, including the role of the researcher.

7.1 Discussion of Findings

7.1.1 Barriers and Drivers

As could be seen in the results, many different barriers and drivers exist for stakeholders to take climate adaptive measures. However, some of these identified barriers and drivers are not necessarily specific to climate adaptation but can be applied to the broader spectrum of taking environmental action, as was also found in a study by Eisenack et al. (2014). Examples are personal beliefs, pressure, financial constraints or an uncertain future. On the other hand, some barriers and drivers are specifically related to climate adaptation, such as the fact that it is not mandatory. This resonates with literature, where the non-mandatory aspect of climate adaptation is a barrier on a governmental level, but also on the level of the stakeholders (Molenveld et al., 2020). This is because a regulatory framework for climate adaptation is currently missing (Houthoff, 2019). Nonetheless, some stakeholders recognise that soon regulations will come up, which drives them to start taking action. In fact, in 2022 a new law on the physical living environment is expected to come in place, which is supposed to replace all existing laws on the physical living environment (Stichting CAS, n.d.). Climate adaptation is expected to play an important role in this new law and municipalities will receive more power to realise their ambitions regarding the creation of a liveable environment (Stichting CAS, n.d.). Furthermore, this law is expected to facilitate the collaboration between governmental bodies by the introduction of new tools (Stichting CAS, n.d.). However, how this will work out exactly is not clear yet.

Another barrier more specific to climate adaptation is having other priorities. The root cause of this barrier can be related to having a different main task, such as education or health care, but also to having other priorities regarding sustainability. Often a trade-off between climate mitigation and climate adaptation still has to be made, usually to the detriment of climate adaptation. A similar result was found, for municipalities, by Reckien et al. (2019), who therefore argued for the “dual track approach”, where next to developing a dedicated climate adaptation approach, climate adaptation is combined with other existing measures. This was also one of the drivers that was identified for several stakeholders.

As is illustrated by these two examples already, many barriers and drivers are interlinked. For example, when the results were given to review an interviewee commented on how financial resources is a similar barrier as having other priorities and unclear responsibilities. Having other priorities, however, can also relate to the fact that climate adaptation is not mandatory. This in turn can also result in stakeholders not taking the time to educate themselves on the topic, resulting in a lack of knowledge, which was a barrier for many stakeholders. On the other hand, they sometimes experience the effects already, which is also a form of knowledge gathering. This shows that it is often a combination or reinforcement of barriers that hinders progress (Biesbroek et al., 2013). As such, it is hard to trace back the lack of action to one specific barrier and solutions should take the interdependency and the dynamics of barriers (and drivers) into account (Eisenack et al., 2014). This requires a holistic approach to developing solutions, rather than a one-by-one solution for each barrier.

A last discussion point is that in this research, most barriers were found in the planning stage, closely followed by the understanding phase. Ekstrom and Moser (2014) also found this difference in barriers between different stages, but for their research on municipalities in the United States, most barriers existed in the understanding phase, followed by the planning phase. They explain this by saying that barriers likely occur most in the phases that are passed through repeatedly. In the Netherlands, the adaptation process is currently moving from an understanding phase to a planning phase (van Bijsterveldt et al., 2021), which could be an explanation for the difference between the results of this thesis and the results of Ekstrom and Moser (2014). Both works however saw significantly fewer barriers and drivers in the managing phase, especially concerning monitoring and evaluation, which is probably because this is not happening yet.

7.1.2 Adaptive Governance

To respond to the identified barriers and make use of the drivers that were found, an adaptive governance framework was developed and applied, consisting of three main features: flexibility, participation and learning.

Flexibility

Flexibility was ensured through the different governance approaches. Although adaptive governance cannot really be pushed inside a model, because of its adaptiveness, four governance approaches were used to illustrate flexibility. It is important to mention that for each phase and stakeholder the *main* governance approach was identified, which tied in best with the drivers and barriers. This does not mean that elements of other governance modes cannot be present. Literature also says that in reality governance modes are often mixed (Bednar & Henstra, 2018). This means that for example a regulation can also be introduced while having a network approach, but then the regulation is likely developed in alignment with the stakeholders, rather than a merely top-down approach. Maintaining this flexibility is key for the progress of climate adaptation.

The results show that all the governance modes are relevant in the process of climate adaptation. This contradicts a large body of literature on climate adaptation, where it is argued that collaborative governance approaches are most appropriate (Baird et al., 2016; Mees, 2017). This is often followed in practice, with many municipalities wanting to apply a collaborative governance approach. As a result, networks, such as the one in Nieuwegein, are being employed as boundary objects to bring stakeholders and governmental bodies closer to each other (Willems et al., 2020). These networks have a great potential for bringing change in municipal climate adaptation issues, but at the same time the underlying institutional practices often largely remain the same (Willems et al., 2020). It is often hard to engage large groups of stakeholders. Therefore, the power of a network should not be overestimated and additional different measures and governance approaches are still required (Bednar & Henstra, 2018).

Participation

Depending on the barriers and drivers that were identified, different dimensions of participation were applied, aligned with the chosen governance approach. These dimensions differ a lot per phase and per stakeholder and are thus very context-specific. This is similar to interactive policy-making, which also consists of several phases, and where stakeholders participate at various levels at various times (Driessen et al., 2001). The results show that for some stakeholder groups it is important to actively engage them early on in the process, whereas for others a more passive form of participation suffices at the beginning. As such, it is not possible to generalise findings on the timing and type of participation, which explains why no general procedure can be given for participation (Reed, 2008). One thing that can be said however is to ensure to not only

engage stakeholders when something is going wrong, resulting in frustration with stakeholders but to make conscious decisions about this in the different phases of the process.

Another note on participation is that especially more active forms of participation, which are recommended in several phases for several stakeholders, are often expected to be resource-intensive and hamper the efficiency of the process. This might be the case in the short term, but when looking at the long-term, which is what climate adaptation requires, this will not hold. The more resources are invested in creating trust relationships with stakeholders in the coming years, the more likely solutions are accepted and implemented in the many years that follow after (de Vente et al., 2016). This clash between long-term and short-term thinking was also identified as an aspect of the bureaucratic barrier, which could be overcome by adaptive governance. With participation being part of that framework, the case for participation is strengthened even further and an argument against active participation should not be based on resources in the short term.

Learning

Learning can help make use of the barriers and drivers because it is through single-loop learning that the barriers and drivers are identified. Furthermore, learning is established in double-loop and triple-loop learning. It is important to note here that especially for double and triple-loop learning, learning should be done by all stakeholders (Pahl-Wostl, 2009). Thus when going from one phase to another, it is not just the municipality that should learn from the previous phase and decide for the next phase, it should be a social learning process. Although this aspect has been less addressed by this thesis, it is highly important and without it, transformation to higher adaptive capacity would not take place (Pahl-Wostl, 2009).

Together the three elements of the adaptive governance framework can address aspects such as strategic thinking, resourcefulness, creativity, effective communication and collaboration, which are seen as key resources to overcome barriers and make use of drivers to enhance the implementation of climate adaptive measures (Ekstrom & Moser, 2014). This will also facilitate the implementation of transformational adaptive measures (Lonsdale et al., 2015). The role of intermediary organisations herein should not be underestimated. For example, to facilitate participation, it is recommended to use a capable independent facilitator that can help with power imbalances, stimulate active engagement with all stakeholders and ensure fair participation (de Vente et al., 2016). Also for learning it was found in both literature and empirical data that an intermediary organisation, such as Club Rhijnhuizen, can play an important role in facilitating double- and triple-loop learning (Pahl-Wostl, 2009). Because of their links with various stakeholder groups, they can reach out to many groups and use the inputs to come up with out of the box solutions needed to move forward in the process of climate adaptation.

7.1.3 Encouraging Stakeholders to Implement Local Adaptation Strategies

To encourage stakeholders to implement local climate adaptation strategies it is important to focus on the needs of each stakeholder group. In literature often three groups of stakeholders are identified: public authorities, civil society and private entities (Gardner et al., 2009; Jänicke, 2017; Reckien et al., 2014). However, the results show that these categories are still too broad and that in the case of Nieuwegein seven stakeholder groups emerged with different needs and wishes. This is not to say that stakeholder groups always have to be approached separately. When they have similar barriers and drivers in a certain phase, they might benefit from a new type of learning between the groups. However, it is important to always do this with the needs and wishes of each stakeholder group in mind.

These needs and wishes include the identified barriers and drivers but also the subsequent interventions based on adaptive governance to overcome the barriers and optimise the use of the drivers. The adaptive governance interventions that have been identified in this thesis are specifically for stakeholders in Nieuwegein and are not a blueprint for other municipalities in the Netherlands. However, insights on the identified barriers and drivers can help others to develop their own adaptive governance interventions. This could be extremely valuable to move forward in the process of climate adaptation, with space for stakeholders to potentially take over the driving seat in certain phases (Mees, 2017). Currently, the shift from government to governance is only slowly happening (Mees, 2017).

However, to develop, but especially to implement, an adaptive governance approach, an organisational change is needed in the way climate adaptation is operated (Rijke et al., 2012). Under the bureaucracy barrier, it was mentioned by almost all stakeholders that climate adaptation requires a new way of working for many organisations. Municipalities as well as other governmental bodies are vertical institutions, whereas society is organised in a horizontal way (van Ginkel, 2021). This can be seen in for example the focus of municipalities on targets, whereas society is organised around values and beliefs. As a result, it is sometimes hard to find a middle ground. A first way to overcome this is to put the challenge, being climate adaptation, but also the barriers and drivers per phase and stakeholder, central (van Ginkel, 2021). This diagonal logic will bring society and governmental bodies closer (van Ginkel, 2021). Secondly, uncertainty needs to be embraced and questions need to be asked (van Ginkel, 2021). Recognising a lack of knowledge is acknowledging complexity, and a first step in tackling it (van Ginkel, 2021). Lastly, organising around people with energy can help to familiarise with the task of climate adaptation (van Ginkel, 2021). As such, personal beliefs play a strong role and often participation is open self-selected or open with targeted recruitment, focusing on interested people. It might seem problematic to only focus on these people however this would be temporary. The more climate adaptation becomes embedded in mainstream activities, the more the focus can be shifted towards non-frontrunners. This does not only work for engaging stakeholders on climate adaptation but can also be applied to other societal issues, such as the energy transition, social housing, health care or education (van Ginkel, 2021).

7.2 Recommendations

7.2.1 Nieuwegein

Various recommendations specifically to the municipality of Nieuwegein are already embedded in the intervention points that follow from the drivers and barriers that have been identified per phase and stakeholder group. These are targeted at the specific stakeholder groups and range from reaching out to schools and commercial real estate owners, who are currently not engaging with the municipality, to setting up park management on business parks. Also continuing with the inspiration sessions with the social housing associations, which can also be an example for other municipalities, and approaching climate adaptation more as a 'liveable environment' topic for citizens is recommended. For real estate developers, it is advised to come up with concrete requirements, from which they can choose the ones that apply to their specific project. All of these recommendations likely require some resources from the municipality, which is something they currently do not have. Therefore, they might not be able to do all of this right now, but it is still important to be aware of these action gaps to know which direction to go in the future. Furthermore, knowing that there is still work to do can help bring in new resources, or reallocate existing resources, especially considering that the strategy and agenda will probably be redeveloped in 2022. Lastly, as already mentioned before, actively engaging stakeholders might require resources in the short term, but if participation is organised well from the start, it will always pay itself back in the long term.

7.2.2 Other Practitioners

These last points are also valid for other municipalities that are struggling with a lack of capacity. Furthermore, some general recommendations can be given to practitioners, being other municipalities as well as intermediary organisations. First of all, it is important to identify who the stakeholders are in each context, and which of those stakeholders are to be addressed at the local level. The seven stakeholder groups that were identified in this research are likely to be present in every municipality, but the dynamics could be different and there could be additional stakeholder groups. Several stakeholder identification techniques exist, such as using specific criteria (e.g. tied to the economic interest and principles and values of stakeholders or their legitimacy, urgency and proximity) or snowballing, where stakeholders can point out additional stakeholders (Luyet et al., 2012). Another technique is to use questions, for which the answers will generate a list of stakeholders (Luyet et al., 2012). To choose a specific identification technique, the context, the phase of the project and the available resources have to be taken into account (Luyet et al., 2012).

Secondly, once stakeholders have been identified, it is recommended to think in advance of what type of barriers and drivers the stakeholders are expected to have. This can help guide the way the design of the participatory process is set up and ensures the process is adapted to the participants (de Vente et al., 2016). Furthermore, the participatory process, for example in the form of risk dialogues, should also focus on the identification of the context-specific barriers and drivers for the individual stakeholder groups. By identifying barriers early on in the process, they cannot just be overcome, but potentially even be prevented or transformed into enablers for change (Biesbroek et al., 2013; Lonsdale et al., 2015). However, as mentioned before, a holistic approach is needed, where the intervention is not just counterpointing the identified barrier but rather takes the whole set of barriers and drivers into account (Brown & Farrelly, 2009).

It is acknowledged that it can be hard to identify barriers and drivers, especially when they are located later on in the process. Although it is impossible to know what will happen in the future, there are a large number of speculative design methods that can facilitate this process and support the development of alternative futures (Sustar et al., 2020). For example, backcasting, which uses the future as a starting point and translates those insights back to the practices of today, or games, which uses the unique nature of problem-solving and decision-making creatively (Sustar et al., 2020). Other methods are diaries, future fictions and exploratory workshops, which all acknowledge stakeholder's needs, experiences and values (Sustar et al., 2020). Two other very useful methods are storytelling and placemaking, where respectively a narrative and a place are used as framing strategy to convey and gather knowledge (Peinhardt, 2021; Verduijn et al., 2012). These methods will not only help to identify barriers and drivers but can also provide both the governmental bodies as well as stakeholders with new insights that could act as drivers. Moreover, the learning loops throughout the whole process ensure that the gained insights remain relevant and provide the possibility to adapt when needed.

7.3 Academic Contributions

7.3.1 Addressing Research Gaps

Regarding academic contributions, this thesis has addressed the research gaps that were identified in the introduction. First of all, explanations for the implementation of agreed outputs on climate adaptation, translated into barriers and drivers, have been given (Jager et al., 2020). However, the research revealed that the outputs were only to a certain extent agreed to, meaning there was no opposition, but in many cases the stakeholders were not even aware of the agreed outputs. A lack of acceptance was thus also not experienced as a barrier to implementation,

which was initially a starting point for this thesis. Rather there was a lack of awareness as shown in the results. Furthermore, in literature it was found that there is a difference between acceptance and support, especially when it comes to active implementation. Because of these findings, it was decided to shift the focus from the initial research gap on finding out why acceptance does not necessarily lead to implementation towards identifying barriers, drivers and points for intervention. As this was done half way through the research, parts of the literature review and methodology address both directions.

Although the identified barriers and drivers are context-specific, they give an insight into what potential barriers and drivers could arise for stakeholders. So far, this had only been done for governmental bodies. Furthermore, these barriers and drivers were used to come up with adaptive governance strategies, responding to the gap of not merely listing barriers, but also coming up with solutions for them (Biesbroek et al., 2013). In doing that, a framework for adaptive governance was developed, which during the research was found to be largely lacking in current literature. Often adaptive governance remains a blurry and vague concept that is hard to apply in practice, leaving practitioners with many questions (Rijke et al., 2012). This thesis hopes to have contributed to existing literature by applying the concept of adaptive governance to a practical case and by doing so, making the concept more concrete.

7.3.2 Identification of New Research Gaps

During the process of this thesis, many new research gaps were identified. Firstly, the initial research gap that has not been addressed in this work, on the relationship between acceptance and implementation, still requires attention. Especially if municipalities in the Netherlands are engaging more with stakeholders, including them in decision-making processes, understanding how acceptance of those decisions will also lead to active action is crucial. A hypothesis for this could be the difference between acceptance and support, as addressed in *section 2.3*. Future research is needed to dive into this topic. Secondly, research could look into the different challenges that the Netherlands or other countries are facing and how the perception of them differs between stakeholders. As was found in this thesis, water and heat are perceived with a different urgency and a different complexity, which could influence the process to take action.

Moreover, several research gaps have been identified regarding the barriers and drivers. They have been determined for the stakeholders in Nieuwegein, but it would be interesting to find out whether similar or different barriers and drivers can be identified in other municipalities. This could be done through for example a multiple case study. Furthermore, future research could look into the root causes of barriers. Although barriers are often interlinked and require a holistic approach, it is important to find out the root causes of the different barrier, to ensure that the right approach is designed to overcome or prevent them. In this way, it is also possible to find out which barriers and drivers are most pressing, which has not been taken into account in-depth in this thesis and deserves further attention. For example, a more systematic approach to the barriers and drivers can help categorise them in importance. This can also tie in with identifying barriers and driver in the managing phase, as significantly fewer barriers and drivers were found there. Lastly, future research could look into whether it is more effective to focus on negative or positive influences (barriers or drivers) to engage stakeholders, or whether the combined approach as in this thesis is desired.

Adaptive governance also requires more research, especially in the field of climate adaptation. First of all, more frameworks have to be developed to make it easier to implement adaptive governance in practice. Furthermore, double and triple-loop learning have only been partly addressed in this thesis and could be further investigated over a longer period. When doing this, special attention needs to be paid to ensure that it is not just the municipality that is learning, but that learning takes place with all the engaged stakeholders to create actual transformation.

Future research also needs to address how this can be ensured. Moreover, this thesis has used a combination of two governance models, but there are many more governance models in literature. It would be interesting to see how the choice of such a model influences the results and the adaptive governance strategies suggested. However, in practice, these models function rather different than in theory. Finding out how such theory is translated to actual practice is another topic that could be addressed in future research. This last point shows that there are different ways of approaching the engagement of stakeholders in climate adaptation. This thesis focused on literature from public administration, with inputs from several other disciplines. Taking a different point of view, such as departing from behavioural sciences, institutional theory or risk management might lead to different results. Comparing these results and potentially combining them, to enrichen the knowledge body on this topic, could be another point for future research.

7.4 Limitations

Various limitations have to be mentioned regarding this research. First of all, within some stakeholder groups, only one informant was interviewed, meaning that the results might not be representative of the entire stakeholder group in Nieuwegein. Even within the stakeholder groups where multiple informants were interviewed, this still could have been a problem. Although this is a clear limitation of this work, the decision was made to focus on the municipality as a whole, rather than focussing on one type of stakeholder group. The main reason for this is that the local level, being the municipality, was chosen as a departure point, since that is where most action needs to happen with regards to climate adaptation. As such, the decision was made to focus on several stakeholder groups on a local level.

Furthermore, when interviewing stakeholders on barriers and drivers to climate adaptation, stakeholders likely mentioned anticipated barriers. Because climate adaptation is uncertain, there are potentially more barriers and drivers that play a role, especially in later phases, but that cannot be identified yet. As said before, speculative design or research methods, but also observations or group interviews, that could have been part of the research design, could potentially have helped address this issue. However, often these methods require physical interaction, which was not possible due to the COVID-19 pandemic. Lastly, because of the short time-period of this thesis, there was no possibility to apply double- and triple-loop learning. Therefore, it remains uncertain how that part of the framework can be applied. A tentative use of it was made, by applying adaptive governance also in phases that have not taken place yet. However, only when a stakeholder moves to the subsequent phase in real life, double-loop learning comes into place. Triple-loop learning requires even more time, as it focuses on the framework as a whole, including all phases.

7.4.1 Role of the Researcher

Lastly, some limitations and personal reflections on the role of the researcher have to be made. First of all, it can be challenging to translate feelings that come with interviews into words. However, they likely have affected the results in some way. To be aware of this, memos were made and used during the whole process of the research. They proved to be especially valuable when writing the discussion. Furthermore, the whole research has been characterised by an adaptive and iterative process. This means that when new information became available the research was adapted and improved to fit the context and available data. Also when interviewing this was applied. The first transcripts made the researcher aware of her way of interviewing. To get to higher quality data, probing techniques were tried out and the interview guide was adapted to ensure that the right questions were asked at the right time. This iterative process has been proven to be very valuable in this research, as later interviews were considered richer in data.

8 Conclusion

It is recognised that stakeholder play an important role in the creation of a climate-resilient society but how this is supposed to happen is unclear. Currently, there is little understanding on how to engage non-governmental stakeholders in the implementation of climate adaptation measures. Therefore, this thesis focused on understanding the barriers and drivers that exist for stakeholders in taking climate adaptive action, as well as trying to understand how those barriers and drivers can be used to enhance stakeholders to take climate adaptive actions. The following research questions have been developed to guide this research:

RQ: How can stakeholders be encouraged to implement local climate adaptation strategies?

SQ1: What barriers and drivers exist for stakeholders to take climate adaptive measures?

SQ2: How can the barriers and drivers be used to enhance the implementation of climate adaptive measures?

To answer these research questions, a case study has been conducted on the municipality of Nieuwegein in the Netherlands. Semi-structured interviews have been held with various stakeholders and documents were collected. These were analysed with the method of a content analysis.

Regarding sub-research question one, the results show that there are many types of barriers and drivers for stakeholders to take climate adaptive measures, categorised in political, informative, technical, resource-based, and social-cultural barriers and drivers. Furthermore, it is highly dependent on both the stakeholder group as well as on the phase of the process whether these barriers and drivers play a role. For example, the housing associations have no clear idea of where the problems are located and what their responsibilities are towards those problems, whereas for companies and business parks a bigger barrier is the lack of a network to collaborate on this topic. Citizens often do not know what the term climate adaptation means, but they know about a liveable environment, while commercial real estate owners and real estate developers have likely developed CSR strategies including goals on this topic. Real estate owners are looking for concrete requirements and integral plans, but for schools, this is not an issue at all, because they are not yet working on climate adaptation due to other priorities and financial constraints. Governmental bodies are looking for collaborations between their organisations, but this is still under development. Although some barrier and drivers might seem more pressing than others, it is the combination of the different barriers and drivers that hinder or facilitate the uptake of climate adaptive measures.

Therefore, a holistic approach is required to use the barriers and drivers to enhance the implementation of climate adaptive measures, addressing sub-research question two. This holistic approach was developed in the form of an adaptive governance framework. This framework was created and applied to understand how the identified barriers and drivers could be used to enhance the implementation of climate adaptive measures. Three main features of adaptive governance were integrated: flexibility, participation and learning. Flexibility was ensured through the different governance approaches – legitimate, achieving, networking or participatory - of which one was selected per stakeholder group and phase. Participation was applied through different dimensions, focussing on the participants, the communication and the authority. For each dimension, a relevant level was selected per stakeholder group and phase. Learning took place in the form of single-loop learning on the barriers, double-loop learning between the different phases and triple-loop learning over the whole process. As these three elements are highly contextualised, they were applied in a different way per stakeholder and phase. As a result, potential interventions also differ per stakeholder and phase. They range

from reaching out to schools and commercial real estate owners, who are currently not engaging with the municipality, to setting up park management on business parks. Also continuing with the inspiration sessions with the social housing associations, which can also be an example for other municipalities, and approaching climate adaptation more as a 'liveable environment' topic for citizens is recommended. For real estate developers, it is advised to come up with concrete requirements, from which they can choose the ones that apply to their specific project. This shows that a blueprint on how to apply adaptive governance to enhance the implementation of climate adaptive measures cannot be given. It is the mix of different governance approaches and participation methods combined with learning that will likely be most successful in overcoming or preventing barriers and optimising the use of drivers.

As a result, this combination is the way forward to encourage stakeholders to implement local climate adaptation strategies, and gives an answer to the overarching research question. Here it is extremely important focus on the individual needs of each stakeholder group. This includes the barriers and drivers as identified in the first sub-research question, but also the subsequent "road map" of the second sub-research question that lays out adaptive governance intervention points to overcome the barriers and optimise the use of the drivers. Therefore, recommendations to the municipality of Nieuwegein can mainly be found as part of the answer to sub-research question two. For other practitioners, three recommendations can be given. First of all, it is recommended to carefully identify the relevant stakeholder groups in each area. Secondly, it is advised to identify the barriers and drivers for each of those stakeholder groups, paying attention to the different phases of the process. Thirdly, it is urged to use an adaptive governance approach to come up with points for interventions to overcome the barriers and optimise the use of the drivers. By being aware of the needs of the different stakeholder groups and understanding how adaptive governance can respond to that, local governments can find different ways to engage stakeholders to (un)pave the way to a climate-resilient society.

Bibliography

- aan de Brugh, M. (2021, January 26). *'Soms denk ik: Laten we dat woord klimaatadaptatie maar schrappen.'* NRC. <https://www.nrc.nl/nieuws/2021/01/26/soms-denk-ik-laten-we-dat-woord-klimaatadaptatie-maar-schrappen-a4029201>
- Adell, E. (2007). The concept of Acceptance. *Poster Session*, 8.
- Amundsen, H., Berglund, F., & Westskog, H. (2010). Overcoming Barriers to Climate Change Adaptation—A Question of Multilevel Governance? *Environment and Planning C: Government and Policy*, 28(2), 276–289. <https://doi.org/10.1068/c0941>
- ANP. (2020, December 13). 2020 was uitzonderlijk droog. *Het Parool*. <https://www.parool.nl/gs-be8f4dd2>
- Arnstein, S. (1969). A Ladder of Citizen Participation. *Journal of the American Institute of Planners*, 35(4), 216–224. <https://doi.org/10.1080/01944366908977225>
- Bache, I., & Flinders, M. (2004). *Multi-level Governance*. Oxford University Press. <https://doi.org/10.1093/0199259259.001.0001>
- Baird, J., Plummer, R., & Bodin, Ö. (2016). Collaborative governance for climate change adaptation in Canada: Experimenting with adaptive co-management. *Regional Environmental Change*, 16(3), 747–758. <https://doi.org/10.1007/s10113-015-0790-5>
- Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. *Landscape and Urban Planning*, 107(2), 127–136. <https://doi.org/10.1016/j.landurbplan.2012.05.009>
- Bauer, A., & Steurer, R. (2014). Multi-level governance of climate change adaptation through regional partnerships in Canada and England. *Geoforum*, 51, 121–129. <https://doi.org/10.1016/j.geoforum.2013.10.006>
- Baxter, J. (2016). Case Studies in Qualitative Research. In I. Hay (Ed.), *Qualitative research in Human Geography* (4th ed.). Oxford University Press.
- Bednar, D., & Henstra, D. (2018). Applying a Typology of Governance Modes to Climate Change Adaptation. *Politics and Governance*, 6(3), 147–158. <https://doi.org/10.17645/pag.v6i3.1432>
- Berkes, F., & Turner, N. J. (2006). Knowledge, Learning and the Evolution of Conservation Practice for Social-Ecological System Resilience. *Human Ecology*, 34(4), 479. <https://doi.org/10.1007/s10745-006-9008-2>
- Biesbroek, G. R., Klostermann, J. E. M., Termeer, C. J. A. M., & Kabat, P. (2011). Barriers to climate change adaptation in the Netherlands. *Climate Law*, 2(2), 181–199. <https://doi.org/10.3233/CL-2011-033>
- Biesbroek, G. R., Klostermann, J. E. M., Termeer, C. J. A. M., & Kabat, P. (2013). On the nature of barriers to climate change adaptation. *Regional Environmental Change*, 13(5), 1119–1129. <https://doi.org/10.1007/s10113-013-0421-y>
- Brown, R. R., & Farrelly, M. A. (2009). Delivering sustainable urban water management: A review of the hurdles we face. *Water Science and Technology*, 59(5), 839–846. <https://doi.org/10.2166/wst.2009.028>
- CBS. (2020a, January 1). *Voorlopige bevolkingsaantallen, 1-1-2020* [Webpagina]. Centraal Bureau voor de Statistiek. <https://www.cbs.nl/nl-nl/maatwerk/2020/11/voorlopige-bevolkingsaantallen-1-1-2020>
- CBS. (2020b, August 21). *Iets hogere sterfte in warme week* [Webpagina]. Centraal Bureau voor de Statistiek. <https://www.cbs.nl/nl-nl/nieuws/2020/34/iets-hogere-sterfte-in-warme-week>
- Chaffin, B. C., Gosnell, H., & Cosens, B. A. (2014). A decade of adaptive governance scholarship: Synthesis and future directions. *Ecology and Society*, 19(3). <https://www.jstor.org/stable/26269646>
- Club Rhijnhuizen. (2020, January). *Klimaatadaptief ontwikkelen in Rijnhuizen—Handreiking voor een toekomstbestendige wijk*. <https://indd.adobe.com/view/d641bf16-ea6b-46da-b148-cc7d9c078a58>
- Collins, K., & Ison, R. (2006, June 6). *Dare we Jump off Arnstein's Ladder? Social Learning as a New Policy Paradigm*. Proceedings PATH (Participatory Approaches in Science & Technology), Edinburgh.
- Colloff, M. J., Martín-López, B., Lavorel, S., Locatelli, B., Gorddard, R., Longaretti, P.-Y., Walters, G., van Kerkhoff, L., Wyborn, C., Coreau, A., Wise, R. M., Dunlop, M., Degeorges, P., Grantham, H., Overton, I. C., Williams, R. D., Doherty, M. D., Capon, T., Sanderson, T., & Murphy, H. T. (2017). An integrative

- research framework for enabling transformative adaptation. *Environmental Science & Policy*, 68, 87–96. <https://doi.org/10.1016/j.envsci.2016.11.007>
- Commissie Kennedy. (2021). *Canon van Nieuwegein*. Canon van Nederland. <http://www.canonvannederland.nl/nl/utrecht/regio-zuidwest/nieuwegein>
- Cope, M. (2016). Organizing and Analyzing Qualitative Data. In I. Hay (Ed.), *Qualitative research in Human Geography* (4th ed.). Oxford University Press.
- Creswell, J. W. (2014). *Research Design: International student edition* (4th ed.). SAGE Publications.
- de Vente, J., Reed, M. S., Stringer, L., Valente, S., & Newig, J. (2016). How does the context and design of participatory decision making processes affect their outcomes? Evidence from sustainable land management in global drylands. *Ecology and Society*, 21(2). <https://doi.org/10.5751/ES-08053-210224>
- della Porta, D., & Keating, M. (2008). *Approaches and methodologies in the social sciences*. Cambridge University Press.
- Deltaprogramma*. (2020). Ministerie van Infrastructuur en Waterstaat, Ministerie van Landbouw, Natuur en Voedselkwaliteit en Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.
- Dowds, J., & Aultman-Hall, L. (2015). Barriers to Implementation of Climate Adaptation Frameworks by State Departments of Transportation. *Transportation Research Record*, 2532(1), 21–28. <https://doi.org/10.3141/2532-03>
- Dreyer, S. J., & Walker, I. (2013). Acceptance and Support of the Australian Carbon Policy. *Social Justice Research*, 26(3), 343–362. <https://doi.org/10.1007/s11211-013-0191-1>
- Driessen, P. P. J., Glasbergen, P., & Verdaas, C. (2001). Interactive policy-making – a model of management for public works. *European Journal of Operational Research*, 128(2), 322–337. [https://doi.org/10.1016/S0377-2217\(00\)00075-8](https://doi.org/10.1016/S0377-2217(00)00075-8)
- Dunn, K. (2016). Interviewing. In I. Hay (Ed.), *Qualitative Research Methods in Human Geography* (4th ed.). Oxford University Press.
- ECLAC. (2021). *Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean* [Text]. Economic Commission for Latin America and the Caribbean. <https://www.cepal.org/en/escazuagreement>
- Eisenack, K., Moser, S. C., Hoffmann, E., Klein, R. J. T., Oberlack, C., Pechan, A., Rotter, M., & Termeer, C. J. A. M. (2014). Explaining and overcoming barriers to climate change adaptation. *Nature Climate Change*, 4(10), 867–872. <https://doi.org/10.1038/nclimate2350>
- Ekstrom, J. A., & Moser, S. C. (2014). Identifying and overcoming barriers in urban climate adaptation: Case study findings from the San Francisco Bay Area, California, USA. *Urban Climate*, 9, 54–74. <https://doi.org/10.1016/j.uclim.2014.06.002>
- Eriksson, J., Glad, W., & Johansson, M. (2015). User involvement in Swedish residential building projects: A stakeholder perspective. *Journal of Housing and the Built Environment*, 30(2), 313–329. <https://doi.org/10.1007/s10901-014-9412-7>
- European Commission. (n.d). *Nature-based solutions* [Text]. European Commission - European Commission. Retrieved March 9, 2021, from https://ec.europa.eu/info/research-and-innovation/research-area/environment/nature-based-solutions_en
- European Commission. Directorate General for Climate Action. (2013). *The EU strategy on adaptation to climate change: Strengthening Europe's resilience to the impacts of climate change*. Publications Office. <https://data.europa.eu/doi/10.2834/5599>
- Fedele, G., Donatti, C. I., Harvey, C. A., Hannah, L., & Hole, D. G. (2019). Transformative adaptation to climate change for sustainable social-ecological systems. *Environmental Science & Policy*, 101, 116–125. <https://doi.org/10.1016/j.envsci.2019.07.001>
- Fleming, J., & Rhodes, R. (2005). *Bureaucracy, Contracts and Networks: The Unholy Trinity and the Police*. <https://doi.org/10.1375/000486505774310244>
- Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, 12(2), 219–245. <https://doi.org/10.1177/1077800405284363>

- Foo, K. (2018). Examining the Role of NGOs in urban environmental governance. *Cities*, 77, 67–72. <https://doi.org/10.1016/j.cities.2018.01.002>
- Fung, A. (2006). Varieties of Participation in Complex Governance. *Public Administration Review*, 66, 66–75. <https://doi.org/10.1111/j.1540-6210.2006.00667.x>
- Fung, A. (2015). Putting the Public Back into Governance: The Challenges of Citizen Participation and Its Future. *Public Administration Review*, 75(4), 513–522.
- Gardner, J., Dowd, A.-M., Mason, C., & Ashworth, P. (2009). *A framework for stakeholder engagement on climate adaptation* (Working Paper No. 3). CSIRO Climate Adaptation Flagship.
- gemeente Nieuwegein. (n.d.). *Rijnhuizen*. Retrieved May 6, 2021, from <https://www.nieuwegein.nl/rijnhuizen/>
- gemeente Nieuwegein. (2018a). *Uitvoeringsprogramma Klimaatadaptatie 2019-2022*. https://www.nieuwegein.nl/fileadmin/bestanden/Inwoner/Projecten/Klimaatadaptatie/Uitvoeringsprogramma_klimaatadaptatie_2019-2022.pdf
- gemeente Nieuwegein. (2018b). *Visie Klimaatadaptatie Nieuwegein*. Gemeente. <https://www.nieuwegein.nl/klimaatadaptatie>
- Glicken, J. (2000). Getting stakeholder participation ‘right’: A discussion of participatory processes and possible pitfalls. *Environmental Science & Policy*, 3(6), 305–310. [https://doi.org/10.1016/S1462-9011\(00\)00105-2](https://doi.org/10.1016/S1462-9011(00)00105-2)
- Grafakos, S., Trigg, K., Landauer, M., Chelleri, L., & Dhakal, S. (2019). Analytical framework to evaluate the level of integration of climate adaptation and mitigation in cities. *Climatic Change*, 154(1), 87–106. <https://doi.org/10.1007/s10584-019-02394-w>
- Hatvani-Kovacs, G., Belusko, M., Pockett, J., & Boland, J. (2016). Assessment of Heatwave Impacts. *Procedia Engineering*, 169, 316–323. <https://doi.org/10.1016/j.proeng.2016.10.039>
- Havermans, O. (2021, January 1). 2020 was een recordwarm jaar: Zeer zonnig, droog, maar ook nat. *Trouw*. <https://www.trouw.nl/gs-b47399d2>
- Hegger, D. L. T., Mees, H. L. P., Driessen, P. P. J., & Runhaar, H. (2017). The Roles of Residents in Climate Adaptation: A systematic review in the case of The Netherlands. *Environmental Policy and Governance*, 27. <https://doi.org/10.1002/eet.1766>
- Houthoff. (2019). *Toenemende hittestress, wateroverlast en droogte in de fysieke leefomgeving*.
- IPCC. (2014). Summary for Policymakers. In C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, M. Chatterjee, K. L. Ebi, Y. O. Estrada, R. C. Genova, B. Girma, E. S. Kissel, A. N. Levy, S. MacCracken, P. R. Mastrandrea, & L. L. White (Eds.), *Climate Change 2014: Impacts, Adaptation, And Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.
- Jager, N. W., Newig, J., Challies, E., & Kochskämper, E. (2020). Pathways to Implementation: Evidence on How Participation in Environmental Governance Impacts on Environmental Outcomes. *Journal of Public Administration Research and Theory*, 30(3), 383–399. <https://doi.org/10.1093/jopart/muz034>
- Jänicke, M. (2017). The Multi-level System of Global Climate Governance – the Model and its Current State. *Environmental Policy and Governance*, 27(2), 108–121. <https://doi.org/10.1002/eet.1747>
- Keele, S. (2017). *Outsourcing adaptation: Examining the role and influence of consultants in governing climate change adaptation* [Doctoral, University of Melbourne]. <http://minerva-access.unimelb.edu.au/handle/11343/194276>
- Keskitalo, E. C. H. (Ed.). (2010). *Developing Adaptation Policy and Practice in Europe: Multi-level Governance of Climate Change*. Springer Netherlands. <https://doi.org/10.1007/978-90-481-9325-7>
- KNMI. (n.d.). *KNMI - Hittegolven*. Retrieved February 3, 2021, from <https://www.knmi.nl/nederland-nu/klimatologie/lijsten/hittegolven>
- KNMI. (2021a). *KNMI - Historisch verloop neerslagtekort*. <https://www.knmi.nl/nederland-nu/klimatologie/geografische-overzichten/historisch-neerslagtekort>
- KNMI. (2021b). *KNMI - Jaarextremen*. <https://www.knmi.nl/nederland-nu/klimatologie/lijsten/jaarextremen/jaar>
- Kreemers, L. M., van Brecht, J., Bakker, T., & Renes, R. J. (2020). *Samen naar een klimaatbestendige omgeving: Burgerparticipatie bij klimaatadaptatie in Hollands Noorderkwartier* (p. 65). Hogeschool van Amsterdam,

- Amsterdams Kenniscentrum voor Maatschappelijke Innovatie. <https://www.hva.nl/akmi/geeelde-content/publicaties/publicaties-algemeen/psychologie-voor-een-duurzame-stad/2020/samen-naar-een-klimaatbestendige-omgeving.html?origin=D98MxPHIS%2Be8MYhDpaWYgg%2CPvyWFBCTp2IP%2FwEVOBy2w>
- Laktić, T., & Pezdevšek Malovrh, Š. (2018). Stakeholder Participation in Natura 2000 Management Program: Case Study of Slovenia. *Forests*, 9(10), 599. <https://doi.org/10.3390/f9100599>
- Lawrence, J. H. (2015). *The adequacy of institutional frameworks and practice for climate change adaptation decision making*. <http://researcharchive.vuw.ac.nz/handle/10063/4707>
- Leitold, R., Revilla Diez, J., & Tran, V. (2020). Are we expecting too much from the private sector in flood adaptation? Scenario-based field experiments with small- and medium-sized firms in Ho Chi Minh City, Vietnam. *Climatic Change*, 163(1), 359–378. <https://doi.org/10.1007/s10584-020-02888-y>
- Leunissen, M. (2020). *Hoe droog wordt Nederland?* Volkskrant Kijk Verder. <http://www.volkskrant.nl/kijkverder/2020/neerslagtekort/>
- Linnenluecke, M. K., Griffiths, A., & Winn, M. I. (2013). Firm and industry adaptation to climate change: A review of climate adaptation studies in the business and management field. *WIREs Climate Change*, 4(5), 397–416. <https://doi.org/10.1002/wcc.214>
- Lonsdale, K., Pringle, P., & Turner, B. (2015). *Transformational Adaptation: What it is, why it matters and what is needed*.
- Luís, S., Lima, M. L., Roseta-Palma, C., Rodrigues, N., P. Sousa, L., Freitas, F., L. Alves, F., Lillebø, A. I., Parrod, C., Jolivet, V., Paramana, T., Alexandrakis, G., & Poulos, S. (2018). Psychosocial drivers for change: Understanding and promoting stakeholder engagement in local adaptation to climate change in three European Mediterranean case studies. *Journal of Environmental Management*, 223, 165–174. <https://doi.org/10.1016/j.jenvman.2018.06.020>
- Luyet, V., Schlaepfer, R., Parlange, M. B., & Buttler, A. (2012). A framework to implement Stakeholder participation in environmental projects. *Journal of Environmental Management*, 111, 213–219. <https://doi.org/10.1016/j.jenvman.2012.06.026>
- Mees, H. L. P. (2017). Local governments in the driving seat? A comparative analysis of public and private responsibilities for adaptation to climate change in European and North-American cities. *Journal of Environmental Policy & Planning*, 19(4), 374–390. <https://doi.org/10.1080/1523908X.2016.1223540>
- Mees, H. L. P., Driessen, P. P. J., & Runhaar, H. A. C. (2012). Exploring the Scope of Public and Private Responsibilities for Climate Adaptation. *Journal of Environmental Policy & Planning*, 14(3), 305–330. <https://doi.org/10.1080/1523908X.2012.707407>
- Miller, S. A., Hildreth, R. W., & Stewart, L. M. (2019). The Modes of Participation: A Revised Frame for Identifying and Analyzing Participatory Budgeting Practices. *Administration & Society*, 51(8), 1254–1281. <https://doi.org/10.1177/0095399717718325>
- Moffatt, S., & Kohler, N. (2008). Conceptualizing the built environment as a social–ecological system. *Building Research & Information*, 36(3), 248–268. <https://doi.org/10.1080/09613210801928131>
- Molenveld, A., van Buuren, A., & Ellen, G.-J. (2020). Governance of climate adaptation, which mode? An exploration of stakeholder viewpoints on how to organize adaptation. *Climatic Change*, 162(2), 233–254. <https://doi.org/10.1007/s10584-020-02683-9>
- Moser, S. C., & Ekstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences*, 107(51), 22026–22031. <https://doi.org/10.1073/pnas.1007887107>
- Munaretto, S., Siciliano, G., & Turvani, M. E. (2014). Integrating adaptive governance and participatory multicriteria methods: A framework for climate adaptation governance. *Ecology and Society*, 19(2), art74. <https://doi.org/10.5751/ES-06381-190274>
- NASA's Global Climate Change. (n.d.). *Climate Change Adaptation and Mitigation*. Climate Change: Vital Signs of the Planet. Retrieved November 23, 2020, from <https://climate.nasa.gov/solutions/adaptation-mitigation>
- National Geographic. (2011, January 21). *Urban heat island*. National Geographic Society. <http://www.nationalgeographic.org/encyclopedia/urban-heat-island/>

- Nationale Klimaatadaptatiestrategie. (2016). *Nationale klimaatadaptatiestrategie 2016 (NAS)*. Ministerie van Infrastructuur en Milieu. <https://klimaatadaptatienederland.nl/overheden/nas/>
- Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19(3), 354–365. <https://doi.org/10.1016/j.gloenvcha.2009.06.001>
- PBL. (2015). *Adaptation to climate change in the Netherlands*. Netherlands Environmental Assessment.
- Peinhardt, K. (2021). Resilience through placemaking: Public spaces in Rotterdam’s climate adaptation approach. *Discussion Paper*. <https://doi.org/10.23661/DP1.2021>
- Reckien, D., Flacke, J., Hurtado, S. D. G., Salvia, M., Heidrich, O., Dawson, R. J., Olazabal, M., Foley, A., Orru, H., Geneletti, D., & Pietrapertosa, F. (2014). Section III-I Urban climate change response and the impact of climate networks in Europe. In *Understanding Cities: Advances in integrated assessment of urban sustainability* (pp. 45–52). Centre for Earth Systems Engineering Research (CESER), Newcastle University. <https://pure.qub.ac.uk/en/publications/section-iii-i-urban-climate-change-response-and-the-impact-of-climate-networks-in-europe>
- Reckien, D., Salvia, M., Pietrapertosa, F., Simoes, S. G., Olazabal, M., De Gregorio Hurtado, S., Geneletti, D., Krkoška Lorencová, E., D’Alonzo, V., Krook-Riekkola, A., Fokaides, P. A., Ioannou, B. I., Foley, A., Orru, H., Orru, K., Wejs, A., Flacke, J., Church, J. M., Feliu, E., ... Heidrich, O. (2019). Dedicated versus mainstreaming approaches in local climate plans in Europe. *Renewable and Sustainable Energy Reviews*, 112, 948–959. <https://doi.org/10.1016/j.rser.2019.05.014>
- Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141(10), 2417–2431. <https://doi.org/10.1016/j.biocon.2008.07.014>
- Reed, M. S., Vella, S., Challies, E., de Vente, J., Frewer, L., Hohenwallner-Ries, D., Huber, T., Neumann, R., Oughton, E., sidoli del ceno, J., & van Delden, H. (2017). A theory of participation: What makes stakeholder and public engagement in environmental management work? *Restoration Ecology*, 26. <https://doi.org/10.1111/rec.12541>
- Rietig, K. (2011). *Public pressure versus lobbying – how do Environmental NGOs matter most in climate negotiations?* (Working Paper No. 79). Centre for Climate Change Economics and Policy.
- Rijke, J., Brown, R., Zevenbergen, C., Ashley, R., Farrelly, M., Morison, P., & van Herk, S. (2012). Fit-for-purpose governance: A framework to make adaptive governance operational. *Environmental Science & Policy*, 22, 73–84. <https://doi.org/10.1016/j.envsci.2012.06.010>
- Rubin, H. J., & Rubin, I. S. (1995). *Qualitative Interviewing: The Art of Hearing Data* (1st ed.). SAGE Publications.
- Simonet, G., & Leseur, A. (2019). Barriers and drivers to adaptation to climate change—A field study of ten French local authorities. *Climatic Change*, 155(4), 621–637. <https://doi.org/10.1007/s10584-019-02484-9>
- Steen, M. van der, Scherpenisse, J., Hajer, M. A., Gerwen, O. J. van, & Kruitwagen, S. (2014). *Leren door doen: Overheidsparticipatie in een energieke samenleving*. <http://www.nsob.nl/wp-content/uploads/2014/06/Leren-door-doen.-Overheidsparticipatie-in-een-energieke-samenleving..pdf>
- Stichting CAS. (n.d.). *Kennisportaal Ruimtelijke Adaptatie* [Overzichtspagina]. Ruimtelijke adaptatie. Retrieved November 16, 2020, from <https://ruimtelijkeadaptatie.nl/>
- Stichting CAS. (2020, July 8). *Steeds meer schade door extreme neerslag en storm*. Klimaatadaptatie. <https://klimaatadaptatienederland.nl/actueel/actueel/nieuws/2020/schade-extreme-neerslag-storm/>
- Sustar, H., Mladenović, M. N., & Givoni, M. (2020). The Landscape of Envisioning and Speculative Design Methods for Sustainable Mobility Futures. *Sustainability*, 12(6), 2447. <https://doi.org/10.3390/su12062447>
- Thaler, T., Attems, M.-S., Bonnefond, M., Clarke, D., Gatien-Tournat, A., Gralépois, M., Fournier, M., Murphy, C., Rauter, M., Papathoma-Köhle, M., Servain, S., & Fuchs, S. (2019). Drivers and barriers of adaptation initiatives – How societal transformation affects natural hazard management and risk mitigation in Europe. *Science of The Total Environment*, 650, 1073–1082. <https://doi.org/10.1016/j.scitotenv.2018.08.306>
- Uittenbroek, C. J., Janssen-Jansen, L. B., & Runhaar, H. A. C. (2013). Mainstreaming climate adaptation into urban planning: Overcoming barriers, seizing opportunities and evaluating the results in two Dutch case studies. *Regional Environmental Change*, 13(2), 399–411. <https://doi.org/10.1007/s10113-012-0348-8>

- Uittenbroek, C. J., Mees, H. L. P., Hegger, D. L. T., & Driessen, P. P. J. (2019). The design of public participation: Who participates, when and how? Insights in climate adaptation planning from the Netherlands. *Journal of Environmental Planning and Management*, 62(14), 2529–2547. <https://doi.org/10.1080/09640568.2019.1569503>
- Uitvoeringprogramma NAS. (2018). *Uitvoeringsprogramma NAS*. Ministerie van Infrastructuur en Waterstaat.
- UNECE. (2021). *The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters*. <https://unece.org/environment-policy/public-participation/aarhus-convention/introduction>
- van Bijsterveldt, M., Boon, E., Hofland, S., van der Horst, S., Stolk, A., & Goosen, H. (2021). *Aanpak klimaatadaptatie door gemeenten: Een kwalitatieve analyse*. Planbureau voor de Leefomgeving. <https://klimaatadaptatienederland.nl/actueel/actueel/nieuws/2021/aanpak-klimaatadaptatie-gemeenten/>
- van den Ende, M. A., Mees, H. L. P., & Hegger, D. L. T. (2021). *When plans become practice: The implementation of climate adaptation what works and what not in terms of governance? A monitoring and evaluation report of five pilot neighborhoods in the region of Utrecht*. Utrecht University.
- van Ginkel, J. (2021, February 3). *De praktijk van samenspel tussen overheid en samenleving* [Inspiratie voor participatie (ZET)].
- van Veen, A., & Boerbooms, M. (2019). *Samenwerken aan goed wonen*. Samen Klimaatbestendig. <https://klimaatadaptatienederland.nl/samen/klimaatbestendig/klimaataanpassingen/corporaties-klimaatadaptatie/>
- Verduijn, S. H., Meijerink, S. V., & Leroy, P. (2012). *How the Second Delta Committee Set the Agenda for Climate Adaptation Policy: A Dutch Case Study on Framing Strategies for Policy Change*. 5(2), 16.
- Visser, V., van Popering-Verkerk, J., & van Buuren, A. (2019). *Onderbouwd ontwerpen aan participatieprocessen— Kennisbasis participatie in de fysieke leefomgeving*. GovernEUR - Erasmus Universiteit Rotterdam.
- Wamsler, C. (2017). Stakeholder involvement in strategic adaptation planning: Transdisciplinarity and co-production at stake? *Environmental Science & Policy*, 75, 148–157. <https://doi.org/10.1016/j.envsci.2017.03.016>
- Wamsler, C., Alkan-Olsson, J., Björn, H., Falck, H., Hanson, H., Oskarsson, T., Simonsson, E., & Zelmerlow, F. (2020). Beyond participation: When citizen engagement leads to undesirable outcomes for nature-based solutions and climate change adaptation. *Climatic Change*, 158(2), 235–254. <https://doi.org/10.1007/s10584-019-02557-9>
- WHO. (n.d.). *Heat and Health*. Retrieved May 6, 2021, from <https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health>
- Willems, J., van Popering-Verkerk, J., & Van Eck, L. (2020). *Tussen overheid en stad; Amsterdam Rainproof en Water Sensitive Rotterdam als grensobjecten* [Rapportage NWO VerDuS SURF Pop Up project]. Erasmus University of Rotterdam.
- Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. *Energy Policy*, 35(5), 2683–2691. <https://doi.org/10.1016/j.enpol.2006.12.001>
- Yin, R. K. (2014). *Case Study Research Design and Methods* (5th ed.). Thousand Oaks, CA: Sage.
- Yusuf, J.-E. (Wie), Neill, K., John, B. S., Ash, I. K., & Mahar, K. (2016). The sea is rising... but not onto the policy agenda: A multiple streams approach to understanding sea level rise policies. *Environment and Planning C: Government and Policy*, 34(2), 228–243. <https://doi.org/10.1177/0263774X15614457>
- Ziervogel, G., & Parnell, S. (2014). Tackling Barriers to Climate Change Adaptation in South African Coastal Cities. In B. C. Glavovic & G. P. Smith (Eds.), *Adapting to Climate Change: Lessons from Natural Hazards Planning* (pp. 57–73). Springer Netherlands. https://doi.org/10.1007/978-94-017-8631-7_3

Appendix A: Survey questions

Note: the survey was conducted in Dutch. The following text and questions are translated in English by the author.

Introduction text:

For my thesis I am doing research on climate adaptation in Dutch municipalities. To get an insight in the trends on climate adaptation I set up this questionnaire, consisting of 8 multiple choice questions and 1 open question. Filling out all the questions takes no more than 3 minutes. The survey is meant for civil servants that are working on climate(adaptation) within their municipality. Climate adaptation is defined as adapting society to the effects of climate change, such as heat, water nuisance, drought and water safety.

By filling in this questionnaire you give your consent for the use of your answers in my research. Participation in this questionnaire is voluntary. Based on the result of the survey, some municipalities will be contacted for potential further research. This research is conducted in collaboration with TAUW and is part of my Master's program at Lund University (Sweden). For more information, feel free to contact Veerle Heijnen (veerle.heijnen@tauw.com or veerle.heijnen.7650@student.lu.se)

Questions:

1. What municipality do you work at?
2. How far is your municipality with conducting vulnerability maps?
 - a. We still have to start (and are planning on doing so)
 - b. We are conducting them at the moment
 - c. We have conducted them
 - d. We do not conduct them
3. How far is your municipality in conducting stakeholder dialogues?
 - a. We still have to start (and are planning on doing so)
 - b. We are conducting them at the moment
 - c. We have conducted them
 - d. We do not conduct them
4. What type of external stakeholders participated in the risk dialogues? (multiple options possible)
 - a. Water board
 - b. Province
 - c. Health authority
 - d. Directorate-General for Public Works and Water Management
 - e. Emergency services
 - f. Water company
 - g. Energy supplier (electricity and gas)
 - h. Regional provider of public transport
 - i. Housing associations
 - j. Companies
 - k. Citizens
 - l. Health care facilities
 - m. Research institutes

- n. Education (kindergarten, primary and secondary education)
 - o. Nature organisations
 - p. Non-governmental Organisations
 - q. We do not conduct stakeholder dialogues
 - r. Other, ...
5. How far is your municipality in the development of a climate adaptation strategy?
 - a. We still have to start (and are planning on doing so)
 - b. We are busy developing the climate adaptation strategy
 - c. We have developed the climate adaptation strategy
 - d. We do not develop a climate adaptation strategy
 6. How far is your municipality in the development of an agenda with concrete measures?
 - a. We still have to start (and are planning on doing so)
 - b. We are busy developing the agenda
 - c. We have developed the agenda
 - d. We do not develop an agenda

7. Acceptance can be measured on two extremes: opposition and support of a plan. These two extremes will be used as a scale for question 7a, see a visualisation below:



7a. To what extent are the outputs of the stakeholder dialogues (e.g. in the form of a climate adaptation strategy, an agenda or a set of principles) accepted internally within the municipality as well as with external stakeholders?

Internally	1	2	3	4	5	6	Not applicable	Other, explain in question 7b
Externally	1	2	3	4	5	6	Not applicable	Other, explain in question 7b

7b. Other: (open answer)

8. How far is your municipality with the implementation of the agenda? (1 = Hardly anything is being done with the agenda; 6: We are working actively to implement the agenda)
 - a. 1
 - b. 2
 - c. 3
 - d. 4
 - e. 5
 - f. 6
 - g. Not applicable
9. To what extent is climate adaptation mainstreamed in retrofitting, the creation of new policies, new buildings, projects etc. (1 = hardly ever, 6 = almost always)
 - a. 1
 - b. 2
 - c. 3
 - d. 4
 - e. 5

- f. 6
 - g. Not applicable
 - h. Other, explain in question 9b
- 9b. Other: (open answer)
10. Do you have any questions/comments on this survey or on climate adaptation in general?

Appendix B: Interviewees

Respondent	Organisation	Function	Duration (h)	Date and time of interview
R1	Municipality Nieuwegein	Civil servant working on climate adaptation	0:45	February 23 rd 15.00
R2	Citizen collective Samen Duurzaam Nieuwegein (Together Sustainable Nieuwegein)	Volunteer	0:50	February 24 th 10.00
R3	Housing association Mitros	Consultant real estate quality and sustainability	0:45	February 26 th 13.00
R4	Robijn (umbrella organisation of elementary schools in Nieuwegein)	Financial and facility manager	0:40	March 3 rd 13.00
R5	Housing association Jutphaas	Head living and real estate	0:30	March 3 rd 15.00
R6	Wereldhave (owner of shopping centre City Plaza in Nieuwegein)	ESG and sustainability manager	0:40	March 4 th 11.00
R7	Water board Hoogheemraadschap de Stichtse Rijnlanden	Consultant spatial planning and law (contact person municipality Nieuwegein)	0:40	March 5 th 14.00
R8	Water board Hoogheemraadschap de Stichtse Rijnlanden	Consultant spatial planning and law (specific project on greening business parks)	0:30	March 8 th 16.00
R9	Ondernemerskring Nieuwegein (entrepreneur group)	Board member	0:40	March 9 th 9.00
R10	Club Rhijnhuizen	Consultant (freelancer)	1:00	March 10 th 10.00
R11	Fortius Real Estate	Project manager (freelancer)/Director	1:00	March 12 th 10.00
R12	Emergency services region Utrecht	Risk and safety specialist	1:00	March 17 th 9.00
R13	Hospital Antonius	Head real estate	1:00	March 17 th 14.00
R14	BPD	Location manager	1:00	March 24 th 13.00

Appendix C: Semi-structured Interview Guide

Note: the interviews were conducted in Dutch. The following questions are translated in English by the author.

1. Introduction

- a. Can you tell me a bit more about *organisation X* and your role within that organisation?
- b. Discuss climate adaptation (does the interviewees know what it is, potentially a different name is used within the organisation).
- c. What do you know about climate adaptation within your municipality? What do you know about the climate adaptation strategy and agenda within your municipality?
 - i. If no, explain and skip section 2.

2. Participation

- a. Has *organisation X* been engaged in setting up the climate adaptation strategy and agenda? In what way?
 - i. If no engagement: ask why, what they think about that, if they were kept updated in a different way, then skip the rest of this section and go to section 3.
- b. Why did *organisation X* want to participate?
- c. Participation:
 - i. From your viewpoint, were all important stakeholder engaged in setting up the strategy/agenda?
 - ii. How was information communicated? What about transparency?
 - iii. How were your viewpoints integrated in the agenda? To what extent did you have a say in the final decision? Who took the final decisions?
- d. What is your relation to other groups that participated in setting up the agenda?

3. Acceptance

- a. To what extent does *organisation X* accept the strategy/agenda? Is there opposition or support for the strategy/agenda within your organization?
 - i. Name some aspects that are directly from the strategy/agenda that affect *organisation X* to test what they think about it.
 - ii. Do these aspects already happen? Are they already implemented? Why do you think that is the case?

4. Implementation

- a. To what extent does *organisation X* take climate adaptive measures? And how is climate adaptation integrated in the work of *organisation X*? Why do you think that is the case?
- b. What are potential barriers *organisation X* experiences in taking climate adaptive measures?
- c. What are ways to overcome these barriers according to you?
- d. Does the municipality stimulate *organisation X* to take climate adaptive measures? In what way? Would you like to see it differently?
- e. What role does the strategy, agenda or just points from the strategy/agenda play?
- f. Has something changed in your organisation since the strategy and agenda were developed in 2018?

- g. When something like taking climate adaptive measures is set in a policy document, what does that mean to *organisation X*?
- h. Is *organisation X* engaging with the municipality right now for implementation (part of the local network)? How?
- i. What is your relation to other groups that are part of the local network?
- j. Participation:
 - i. From your viewpoint, are all important stakeholder engaged?
 - ii. How is information communicated?
 - iii. To what extent do you have a say in the decisions?

Appendix D: Codes and Themes

This appendix shows the coding structure, where grey codes turned out to be less relevant than expected and not guiding in the development of themes. On the other hand, the table shows new codes and themes that emerged during the analysis (these codes and themes were added under respectively barriers and drivers in the coding structure). Behind the codes questions that give an idea of what that code entails are given in italic.

1. Acceptance
 - a. Accept – *do they accept, agree on the strategy and the content?*
 - b. Lack of awareness – *do they know there is a strategy and what it entails?*
 - c. Oppose – *is there resistance against the strategy? How does that manifest?*
 - d. Support - *actively implementing the strategy/ agenda*
2. Background information - *background information on the organisation and person*
3. Implementation
 - a. Actions - *what have they done on climate adaptation so far?*
 - b. Barriers - *what obstacles do they encounter?*
 - c. Drivers - *what factors facilitate the process of climate adaptation?*
 - d. Prevent or overcome barriers – *what suggestions are given to move further in the process of climate adaptation, to tackle barriers, to make use of drivers?*
 - i. Network klimaatklaar - *to what extent does this facilitate or is it expected to support the process?*
 - ii. Roles - *what roles do they see for themselves, for the municipality in next steps?*
4. Participation
 - a. Authority – *to what extent did they have a say in the adaptation strategy?*
 - b. Communication – *how was everything communicated, one-way, two-way dialogue?*
 - c. Output – *what is the result of the participation, has something changed?*
 - d. Representation – *were they (or others) even present in the participation?*

	Barriers	Drivers
Political	Lack of an integral plan	Upcoming regulation
	Lack of pressure	Pressure
	Lack of concrete requirements	
	Unclear responsibilities	
	Lack of a good example	
	Lack of ownership	
	Not mandatory	
	Hard to keep up to date	
	Bureaucracy	
	Lack of authority	
Informative	Lack of knowledge (on climate adaptation and measures)	Experience effect of climate change
	Uncertain future	Education
	Loss of knowledge	
Technical	Drawbacks of measures	Easy solutions
	Building characteristics	Combined with other measures
Resources	Financial costs	Financial benefits

	Other priorities	Prevent damages
	Lack of network	Save water
	Lack of collaboration	Image towards each other
		Increase property value
		Self-interest
Social-cultural	Personal belief	Personal beliefs
	Lack of recognition	Exemplary function
	Lack of learning	Striving towards sustainability
	Differences between stakeholders	Liveable environment
		Aesthetic value