The research presented in this dissertation was conducted at Utrecht University, Faculty of Geosciences and in collaboration with University of Amsterdam, Faculty of Social Sciences. The research was carried out within the Dutch research program Knowledge for Climate, Climate Proof Cities (Theme 4), which was funded by the Ministry of Infrastructure and the Environment.

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How mainstream is mainstreaming?

The integration of climate adaptation into urban policy

Caroline J. Uittenbroek

HOW MAINSTREAM IS MAINSTREAMING?

THE INTEGRATION OF CLIMATE ADAPTATION INTO URBAN POLICY

Hoe 'mainstream' is mainstreaming?
De integratie van klimaatadaptatie
in stedelijk beleid

(met samenvatting in het Nederlands)

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit Utrecht
op gezag van rector magnificus prof. dr. G.J. van der Zwaan,
ingevolge het besluit van het college voor promoties te verdediging
op vrijdag 28 november 2014 des ochtends te 10.30 uur

door
Caroline Josephina Uittenbroek
geboren op 17 januari 1985
te Heemstede

Promotoren:	Prof. dr. T.J.M. Spit Prof. dr. W.G.M. Salet
Co-promotoren:	Dr. L.B. Janssen-Jansen Dr. H.A.C. Runhaar

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Climate change threatens our daily cup of coffee. By the end of the century, the area suitable for coffee cultivation may have dramatically shrunk as a result of changing weather patterns. In a worst case scenario, the Arabica coffee plant can even become extinct. This is just one of the many impacts that we can expect as a result of climate change: others are, for example, weather extremes, substantial water shortages, a possible increase in allergies, changes in biodiversity and so on.

If you told me this information about climate change affecting coffee before I started my PhD, this news would not have bothered me. Every Saturday for almost ten years I have sold coffee in bags or cups, but I never once drank it. I loved the smell of freshly ground coffee beans, but disliked the bitter taste. This changed the day that I started my PhD and began participating in coffee culture. For those who wonder: coffee culture is 'a series of associated social behaviors that depend heavily upon coffee, particularly as a social lubricant'. In other words, coffee means company. And company is what you need when you write a PhD dissertation, because writing a dissertation could be lonely – or so I was told. For those who know me, know that I am not the person to be lonely. Fortunately, I had two work locations – at Utrecht University and University of Amsterdam – where I could find company.

So it began with a latte macchiato with the two ladies down the hall at Utrecht University. This led to a weekly routine of morning coffee breaks with the company of these keen ladies. I soon started having coffee breaks in Amsterdam as well. After a year or so I switched desks at the University of Amsterdam; moving into a room with a coffee machine. This established a new routine of two coffee breaks a day and the company of two smart men. This company expanded when we moved to another building, but for this I had to trade my direct access to the coffee machine. Also at Utrecht University, I made new coffee partners as people moved in and out the hallway. It did not take long or my coffee routine had expanded to outside the university (coffee with my workout buddies) and into the weekend (coffee with my parents and family 'in de Jordaan' on Saturdays). Finally, it resulted in the purchase of a coffee machine at home so I could make my own cappuccinos and enjoy it with Tim and Vesper.

Drinking coffee has become an important activity during the writing of my PhD. It provided me with a lot of interesting and funny conversations with great people – many I already knew from earlier endeavors, many more I met via new networks such as Knowledge for Climate, Climate Proof Cities, PLPR and AESOP; and several let me interview them for my research. For everybody who drank coffee* with me during my PhD, I want to thank you for your company, knowledge and inspiration.

In addition, I want to explicitly thank my supervisors: Tejo Spit, Willem Salet, Hens Runhaar and Leonie Janssen-Jansen. Every time I said to someone I have four supervisors, they would pity me. How could I deal with so much input? Yet I never experienced this as a problem since all of you provided a unique quality that would systematically improve my research: Tejo's pragmatism, Willem's theoretical sketches, Hens' preciseness and Leonie's inquisitiveness. I admire that you kept up with all my plans and ideas and thank you for the support you provided me throughout.

Amsterdam, July 2014

* or any other drink of which the production is threatened by climate change, for example: water, tea, hot chocolate, wine and beer ☺

Patience gets us nowhere fast

CHAPTER 1 | Introduction

Climate change is one of the challenges that cities have to face in the forthcoming decades (IPCC 2014, EEA 2012, OECD 2010, Worldbank 2010). Cities are vital economic and political entities in today's society, regionally and internationally (Hunt and Watkiss 2011). The majority of the world's population is currently living in cities (WHO 2014) and makes use of daily urban systems and services. Cities are also responsible for a significant amount of greenhouse gas emissions, and in this way they contribute to climate change (Hoornweg et al. 2011, Rosenzweig et al. 2010, Satterthwaite 2008a). As a response, several municipalities have advanced climate policy initiatives by, for example, setting GHG reduction targets and establishing energy-saving programs (Reckien et al. 2014, Castán Broto and Bulkeley 2013). These initiatives aim to limit the amount of long-term climate change. This is referred to as climate mitigation. Although these current municipal efforts at mitigation remain crucial to minimizing the possible consequences of climate change, they will not be sufficient to avoid climate change entirely. Some climate change is inevitable (e.g. IPCC 2014, 2012, 2007, Bedsworth and Hanak 2010, Davoudi et al. 2009). Cities need not only to focus on climate mitigation but also to start to adapt to climate change (IPCC 2014, Bulkeley 2013, Jordan et al. 2010). This entails an extension of the challenge of climate change: from climate mitigation to climate adaptation. Following IPCC (2007, 869), climate adaptation is considered as the process of "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits mutual opportunities".

This PhD dissertation addresses the governance of climate adaptation in cities. Municipalities play an important role in the governance of climate adaptation as they can organize responses, set up networks and manage the allocation of resources (Measham et al. 2011, Agrawal 2008). As municipalities are becoming aware of this role, they are searching for different approaches to address climate adaptation in urban policy. In academic literature, two distinct governance approaches to climate adaptation have been discussed: a dedicated approach and a mainstreaming approach. Whereas in the dedicated approach climate adaptation is established as a new policy domain (e.g. Moser and Ekstrom 2010, Grothmann and Patt 2005, Klein et al. 1999, Risbey et al. 1999), the mainstreaming approach aims to integrate climate adaptation into existing policy domains (e.g. urban planning, water management, public health) (Kok and De Coninck 2007, Smit and Wandel 2006, Huq and Reid 2004, Huq et al. 2003). The expected benefits of mainstreaming are an increase in the cohesion between policies, the reduction of possible duplications or contradictions in policies and, the opportunity of taking advantage of synergies (Rauken et al. 2014, Biesbroek et al. 2009a, Kok and De Coninck 2007, Klein et al. 2007, Schipper and Pelling 2006).

Although mainstreaming is considered to be a promising governance approach, an unequivocal understanding of the mainstreaming approach is currently lacking. In academic literature, there is no conceptual clarity, and it has been only applied incidentally in practice. The lack of a clear understanding makes it difficult to establish whether mainstreaming lives up to its promises and subsequently, if mainstreaming contributes to the climate-proofing of cities. This dissertation aims to address this knowledge gap concerning the mainstreaming of climate adaptation in urban policy. For this, a research strategy is applied that combines various theoretical perspectives – including governance, planning, political and organizational science – with empirical evidence obtained through a multiple-case study research. In the remainder of this chapter, this research topic and strategy is explicated. This is undertaken in the following stages: (I) background and problem outline, (II) the research aim and questions, (III) the research design (including case selection, research methods and data collection), and (IV) an outline of the dissertation.

1.1 CITIES AND CLIMATE ADAPTATION

1.1.1 Anticipated climate change impacts at the urban level

The anticipated impacts of climate change are an increase in temperature, sea level rise and more extreme weather events (IPCC 2014). These impacts can increase the risk of heat stress, periods of drought and (urban) flooding. Cities are relatively vulnerable to these climate change risks. These risks will put additional stress on the often densely built environment and affect the operation of daily urban systems and services.

For many cities situated near or in deltas, flooding from sea level rise, an increase in discharges of rivers and storm surges are serious threats as they can result in economic damage to buildings and infrastructure, social disruption and human health impacts (Kundzewicz et al. 2014, Hallegate et al. 2013, Hunt and Watkiss 2011). More extreme precipitation events can result in urban floods and combined sewage overflows (Nilsen et al. 2011). Overall, cities have more hardened surfaces and less green, which complicates the run-off of excessive stormwater (Lindley et al. 2006, Gill et al. 2007). As sewers may overflow and streets could flood, this can cause traffic interruption, economic loss and pollution (Qin et al. 2013). The large amount of hardened surfaces in cities also intensifies the impacts of heat. These surfaces absorb and trap heat rather than reflect it, which results in higher temperatures in urban areas. The increase of hot days and heatwaves can lead to discomfort, reduction of labor productivity, illness and heat-related mortality (Bobb et al. 2014, Gartland 2008).

If cities neglect to invest in climate adaptation today, they will have to deal with the future costs of possible damage to the daily urban systems and services. These future costs could outweigh the current investments needed

for cities to become 'climate-proof' (EEA 2012, Tompkins et al. 2010). Many of the climate change risks can be addressed by physical interventions in urban design: for example, by extending the green infrastructure, installing more water applications or storage capacity, lowering the building density and considering other materials (e.g. permeable pavement, green roofs) (Tennekes et al. 2013, Kleerekoper et al. 2012, Runhaar et al. 2012, Gill et al. 2007). The need for physical interventions in urban design will vary per city as the impact of climate change risks and vulnerability to these risks will differ per location (Hunt and Watkiss 2011). However, climate adaptation is not solely a technical issue. These technical measures need to be planned and implemented and this may require a social change (van Nieuwaal et al. 2009, Smit et al. 1999). Consequently, it is also an issue of governance.

1.1.2 The urban governance of climate adaptation

Although climate adaptation can be addressed on various spatial scales, several researchers argue the relevance of adapting to climate change at the urban level (e.g. Castán Broto and Bulkeley 2013, Carter 2011, Rosenzweig et al. 2010). This is because firstly, as discussed in the former paragraph, the planning and implementation of technical measures are generally needed in the built environment and can be best organized at this level as impacts and vulnerability to risks may vary locally (Hunt and Watkiss 2011). Secondly, the responsibilities for (spatial) planning are generally with municipalities (Amundsen et al. 2010, Wheeler et al. 2009). Consequently, municipalities are considered to play an important role in the governance of climate adaptation by setting up policies, programs and responses. The involvement of governments in climate adaptation is also referred to as 'planned' climate adaptation as opposed to 'autonomous' adaptation which is undertaken by individual private actors (Eriksen et al. 2011, Füssel 2007, Stern 2007).

This distinction illustrates that the governance of climate adaptation in cities involves more actors than just the municipality. Private actors, such as citizens, business and organizations, also have responsibilities in adapting to climate change (Mees et al. 2012, Agrawala and Fankhauser 2008). This is also how governance is usually understood as a process that is "composed of multiple actors including public, private or civil society organizations held together through formal or informal institutions" (Kjaer 2004). One important reason for the involvement of private actors in the governance of climate adaptation in cities is that many of the buildings and land are privately owned. Generally, municipalities can only (physically) alter the design of public space, not that of private property. However, municipalities can govern – that is, make purposeful efforts to steer, control or manage (Wilson and Termeer 2011, van Nieuwaal et al. 2009) – other actors to adapt to climate change, for example by regulations, (financial) incentives, and knowledge dissemination (Bulkeley and Kern 2006).

In governance literature, a shift from 'government' to 'governance' is identified. This implies a shift from hierarchical and well-institutionalized forms of steering in which the government is the dominant actor, are complemented with, or replaced by more polycentric forms of governance in which multiple actors participate in decision-making based on shared institutional settings (Rhodes 2007, Jordan et al. 2005). This shift has been a response to globalization, international movements of capital and, neo-liberal and deregulatory forces (Wilson and Termeer 2011). It should be stressed that this shift towards more polycentric forms of governance does not necessarily imply less involvement of the government. Several researchers have observed that in the governance of climate adaptation, governments have generally taken the lead (Castán and Bulkeley 2013, Mees and Driessen 2011, Storbjörk 2010).

Despite the growing number of cities that are adapting to climate change, the planning and implementation of climate adaptation remains slow (Reckien et al. 2014, Carter 2011). Within municipalities, policymakers still perceive various barriers that hamper the governance of climate adaptation. Examples of such barriers are uncertainty about the risks and impacts, limited financial resources, little local expertise, an undefined role for local governments and a lack of political commitment (e.g. Biesbroek 2014, Bierbaum et al. 2013, Bulkeley and Betsill 2013, Runhaar et al. 2012, Moser and Ekstrom 2010, Amundsen et al. 2010, Sippel and Jenssen 2009). Therefore, municipalities are searching for different governance approaches to address climate adaptation in urban policy. As discussed in the introduction paragraph, two distinct governance approaches to climate adaptation can be identified in academic literature: a dedicated approach and a mainstreaming approach.

This PhD dissertation focuses predominantly on the mainstreaming approach because empirical studies have shown that in practice, the preference goes not to processes that only serve climate adaptation, but to more comprehensive solutions such as mainstreaming (Herrfahrdt-Pähle 2012, Berrang-Ford et al. 2011, Larsen 2011, Otto-Banaszak et al. 2010, Matzarakis and Endler 2010, Tompkins et al. 2010). However, in academic literature, mainstreaming is related to various concepts which might lead to confusion regarding the understanding and intention of mainstreaming. Hence, the next paragraph discusses briefly how mainstreaming is interpreted and applied in literature.

1.1.3 Mainstreaming and related concepts

In academic literature, mainstreaming is considered to be a specific form of Environmental Policy Integration (EPI) (Runhaar et al. 2014, Rauken et al. 2014, Adelle and Russel 2013, Jordan and Lenschow 2010). Both concepts concern the external integration of a policy objective into existing policy domains, and are expected to lead to more effective and efficient policymaking. The main difference is that EPI employs a larger scope of environmental issues, and

mainstreaming focuses primarily on climate change. Recently, the concept of Climate Policy Integration (CPI) has also been employed, but this is essentially the same as mainstreaming as it also focuses on establishing synergies between climate change and existing policy (Runhaar et al. 2014, Jordan and Lenschow 2010, Mickwitz et al. 2009, Ahmad 2009). Several researchers have, however, observed that the level of the ambition for the integration of mainstreaming (or CPI) is in general lower than that of EPI (Runhaar et al. 2014, Rauken et al. 2014). The ambition of EPI is to gain priority for environmental issues that are integrated, whereas in mainstreaming the ambition is only to gain attention for climate change and the related challenges of mitigation and adaptation.

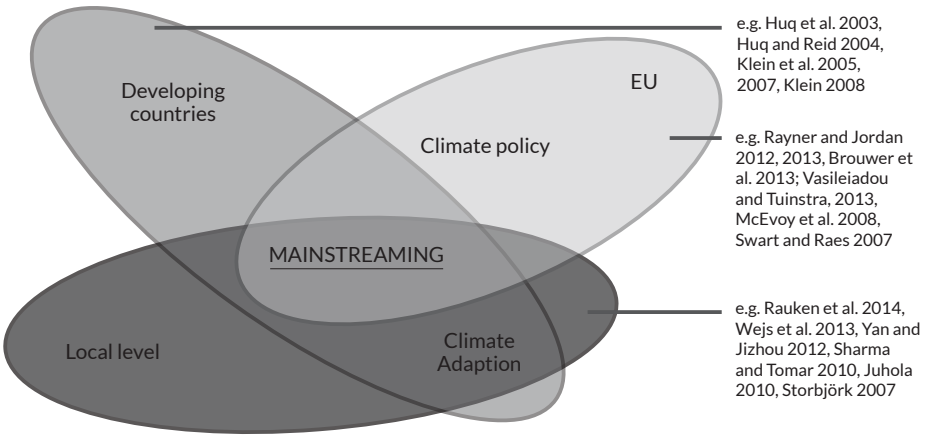
The concept of mainstreaming has evolved in the past decade and has been applied in different contexts (see also figure 1.1). Mainstreaming was first put forward at the World Summit on Sustainable Development in Johannesburg (2002) (McEvoy et al. 2008). Back then, the concept focused on integrating climate adaptation into development assistance, poverty reduction and risk management (see e.g. Klein 2010, Klein et al. 2007, 2005, Huq and Reid 2004, Huq et al. 2003). In EU policies the term mainstreaming was also explicitly connected to developing countries; while for EU countries the term integration was used. Yamin (2005) noticed that no clear distinction could be made between the aims of the two concepts. In the Green paper (EC 2007) and White paper (EC 2009) of the European Commission, this terminology was accordingly changed and the mainstreaming of climate policy also became an important goal for EU countries (Brouwer et al. 2013). As stated on the website of the EU commission today:

> "Climate policy mainstreaming means that actors whose main tasks are not directly concerned with mitigation of, or adaptation to, climate change also work to attain these goals. For instance, the EU climate and energy package sets emission reduction targets for several sectors. However, reaching sector-specific targets often requires measures in other sectors as well." (EC 2014)

This quote illustrates that the EU has a double role in addressing climate change as it takes part in international negotiations on carbon reductions as well as having to develop effective policy on mitigation and adaptation in the EU countries (Jordan et al. 2010). In the EU commission's application of mainstreaming, the concept is stretched to climate policy in general (Brouwer et al. 2013, Vasileiadou and Tuinstra 2013, Rayner and Jordan 2013, 2012, McEvoy et al. 2008, Swart and Raes 2007), and not specifically related to climate adaptation, as was the case in the development studies literature.

Another strand of literature focuses on mainstreaming and climate adaptation at the local level (Rauken et al. 2014, Wejs et al 2013, Yan and Jizhou 2012, Sharma and Tomar 2010, Juhola 2010, Storbjörk 2007). This is also where this

Figure 1.1 | Differences in academic literature concerning mainstreaming



dissertation is positioned. In this niche, mainstreaming is once more focused solely on climate adaptation but specifically on the possibilities of mainstreaming at the local level. This is considered the appropriate level to adapt to climate change because of the several reasons stated throughout this section: (I) the local variation in possible impacts of climate change, urban vulnerability and adaptive capacity, (II) most climate adaptation measures imply physical alterations to the urban design, and (III) the generally large role of municipalities in spatial planning (Amundsen et al. 2010, Bulkeley 2010, Bulkeley et al. 2009, Kern and Alber 2008).

While several researchers promote mainstreaming as a promising governance approach to climate adaptation at the local level, only a few researchers support this statement with empirical evidence that exemplifies what the mainstreaming of climate adaptation in urban policy entails and what can influence this process. This illustrates that the understanding of mainstreaming is still in its infancy and that further exploration of the concept is necessary.

1.2 RESEARCH AIM AND QUESTIONS

The previous section establishes that it is important to explore governance approaches to address climate adaptation and mainstreaming in particular as the attention for this approach is increasing both in literature and practice, but no unequivocal understanding of mainstreaming exists. Without a clear understanding, it becomes difficult to assess whether mainstreaming is producing the promised benefits and whether it contributes to the climate-proofing of cities.

The main research aim of this dissertation is therefore:

- To develop an in-depth understanding of mainstreaming in relation to climate adaptation and urban policy.

This dissertation intends to achieve this aim in four stages. The first stage involves the characterization of mainstreaming by opposing it to a dedicated approach to climate adaptation in particular. In the second stage, possible barriers and opportunities for mainstreaming will be explored. Subsequently, in stage three, strategies to promote mainstreaming will be identified. Finally, in stage 4, criteria to evaluate mainstreaming in practice will be established.

In doing so, the dissertation aims to contribute to the literature on the governance of adaptation to climate change and specifically to the research on the mainstreaming of climate adaptation. The research combines multiple perspectives to establish conceptual and analytical frameworks and apply these to empirical cases. The empirical cases are used to both illustrate and refine the conceptual understanding of mainstreaming. While the governance of adaptation literature provides an initial insight into possible barriers, opportunities and strategies, other research disciplines (for example, planning, public policy, political and organizational science) can offer new perspectives to develop the in-depth understanding that is currently lacking in the research on the mainstreaming of climate adaptation.

Yet the aim is not only contribute to the governance of adaptation but also to planning theory and practice. Many researchers have sought to address the complexities in spatial planning processes (e.g. Ratcliffe and Krawczyk 2011, Innes and Booher 2010, Healey 2006ab). This is an ongoing endeavor as new priorities are frequently added to the planning process. Climate adaptation is one of these most recently added priorities, as several researchers have advocated the need for integration of climate adaptation in spatial planning (e.g. Davoudi et al. 2009; Blanco et al. 2009; Wheeler et al. 2009; Biesbroek et al. 2009a). Spatial planners have to cope with the changes to the physical environment as a result of climate change (Bedworth and Hanak 2010) and additionally, realize that much of the vulnerability to climate change is determined by spatial planning and design (e.g. Tennekes et al. 2013, Kleerekoper et al. 2012, Gill et al. 2007).

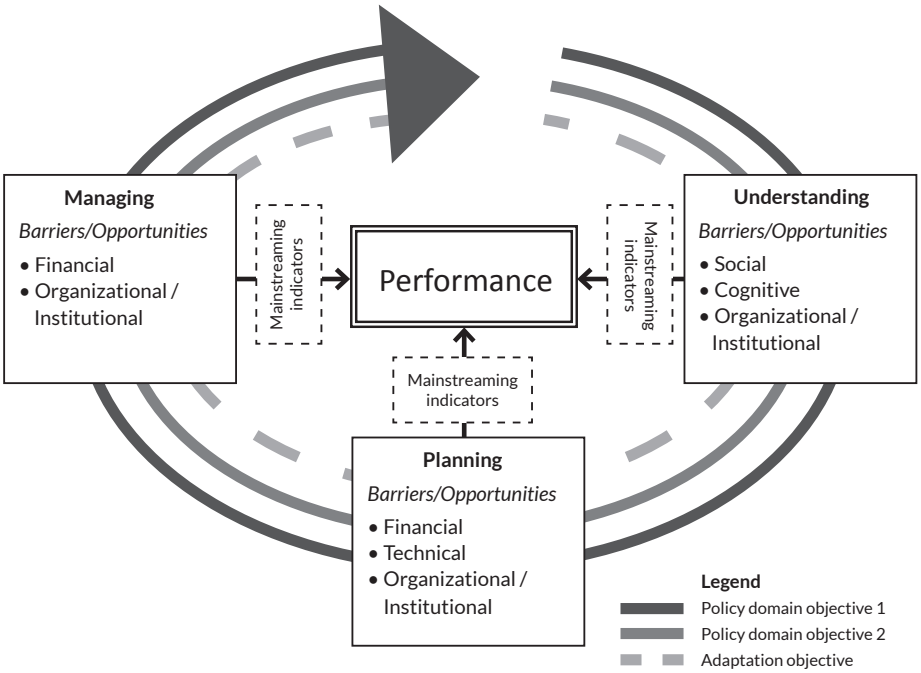
To clarify, spatial planning is not the only policy domain in which the mainstreaming of climate adaptation is advocated. Other policy domains, such as water management, public infrastructure, transportation, environment, and public health, are also expected to be affected by climate change (Hunt and Watkiss 2011, Satterthwaite 2008b) and are therefore also candidates to adapt to climate change. Since the findings are considered to be relevant for urban planning and these other policy domains, the general concepts of urban

policy, policy processes and policymakers are applied throughout the dissertation. In this way, the dissertation intends to appeal to various policy domains and policymakers that are faced with the challenge of climate adaptation. This dissertation may provide them with new insights on how mainstreaming might be able to assist in this challenge, and possible strategies that might instigate this process.

A conceptual model has been developed to provide an initial understanding for mainstreaming (see figure 1.2). This model conceptualizes mainstreaming as a process in which climate adaptation objectives are to be integrated in policy processes. By combining this model with the four steps related to the research aim, four research questions have been developed. These are introduced below.

RQ1 | *How can the mainstreaming of climate adaptation be conceptualized?*
The aim of this theoretical research question is to develop a conceptual framework that characterizes the mainstreaming of climate adaptation in terms of a process or approach. This conceptualization is to be based on two steps. The first step is to establish a model in which mainstreaming is conceptualized as a process (see figure 1.2). This model also includes possible influences to this process and indicators to evaluate the process. Input for this model is derived from a literature review. The second step is to provide a contrast between mainstreaming and a dedicated approach to climate adaptation. In doing so, the

Figure 1.2 | Conceptual model for initial understanding of mainstreaming



intention is to present a more distinct set of characteristics for mainstreaming. This conceptual framework is elaborated on in Chapter 2 and forms the basis for Chapters 3 to 6.

RQ2 | *What are the barriers to and opportunities for mainstreaming and to what extent can these be linked to different phases of a policy process?*

This research question aims to explore potential barriers to and opportunities for mainstreaming climate adaptation. The intention is not to provide (new) lists of possible barriers and opportunities, but to gain insights into how and why barriers and opportunities, that are already identified in academic literature, occur. By extracting theories from other disciplines such as political and organizational science, some of these barriers and opportunities might be better understood. In addition, these theories could shed light on the occurrence and persistence of possible barriers and opportunities. This could assist in the investigation of whether certain barriers and opportunities could be linked to the different phases of the policy process. An initial allocation is presented in the model of Chapter 2, but the empirical cases in Chapters 3 to 6 are used to further refine this.

RQ3 | *Which deliberate strategies can promote climate adaptation in cities?*

In addition to the exploration of possible barriers and opportunities, this research question aims to reveal strategies[1] that municipalities can deliberately apply to promote climate adaptation, to avoid or overcome barriers and exploit opportunities. Some of these deliberate strategies will be identified through literature review and others will be extracted from the empirical cases (Chapter 3 to 6).

RQ4 | *How can the mainstreaming of climate adaptation in urban policy be evaluated?*

In the governance of adaptation literature, no evaluation criteria are established for mainstreaming.This makes it difficult to validate whether mainstreaming is actually occurring or not and what the outcomes are. Therefore, this research question aims to advance two sets of indicators[2]. The first set of indicators intends to provide insight into the extent of mainstreaming during the different phases of the policy process, while the second set of indicators evaluates the outcomes of mainstreaming. The initial sets are introduced in Chapter 2 and accordingly, applied and expanded in the following chapters (3 to 6).

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[1] In the Chapters 2-6, strategies are also referred to as opportunities or stimuli. In Chapter 7, a distinction is made between strategies that can be deliberately employed and 'windows of opportunity' – that is opportunities that are created by external factors.

[2] To clarify, the intention of this research question is not to evaluate whether mainstreaming results in effective and efficient policymaking. The empirical cases will not be assessed on this as this does not fall within the scope of the main research aim.

1.3 RESEARCH DESIGN

1.3.1 Multiple-case study design and case selection

The research applies a multiple-case study design (Bryman 2008, Yin 2003). A case study allows for studying a phenomenon in its real-life context (Yin 2003). It can lead to valuable insights in patterns and processes within or between cases. A comparison between cases exemplifies the similarities and differences and in this way, provides insight into the variation in possible causal processes researched in the cases (Bryman 2008, Seawright and Gerring 2008).

In total, six cities have been used as cases in this dissertation. Within these cases, special attention is given to climate adaptation responses. These could be strategic and/or operational responses and have been selected on the notion of a possible response to adapt to climate change. That is to say, climate adaptation did not need to be the explicit or the primary goal of the response, but references to climate change and associated risks were searched for in case-related policy documents. These climate adaptation responses in the cases are referred to as embedded cases (see table 1.1).

Depending on the chapter, a comparison is made between cases or within a case, between the embedded cases. Each chapter contains a section that will specify and explain the applied case study design in detail.

1.3.2 Case selection

As can be seen in table 1.1, all but one case is situated in The Netherlands. The Royal Netherlands Meteorological Institute has developed several possible climate change scenarios for The Netherlands until 2050 (which have been updated in 2014). Although these scenarios vary in the global temperature rise and changes in airflow patterns, there are five general projections. First, the temperature will continue to increase in The Netherlands. This will result in softer winters and hotter summers with possibly more heatwaves. The latter implies that there is a higher risk of heat stress. Second, the Dutch winters are expected to become wetter as downpours become more extreme and more frequent. Also, in the summer, the intensity of precipitation events is calculated to increase. This implies that cities might experience more urban flooding events. Third, the sea level will continue to rise, and faster than first projected. This indicates an increase in flood risk. Fourth, the wind speed is expected to decrease. Fifth, less foggy days are predicted which means that visibility will improve, and the amount of solar radiation near the surface is anticipated to increase slightly (Klein Tank et al. 2014).

As a result of these expected changes, climate change-related risks such as (urban) flooding and heat stress are expected to occur more often in Dutch

urban areas (van den Brink et al. 2014, Runhaar et al. 2012, Bouwer et al. 2010, PBL 2009). In the past decade, The Netherlands has invested in climate adaptation science in order to understand these and other climate change-related risks, and explore possible solutions (Veraart et al. 2014) – e.g. the research programs 'Room for the River', 'Climate Changes Spatial Planning' and 'Knowledge for Climate'. This has also triggered policy actions on various government levels including the local level (Swart et al. 2014). These actions make The Netherlands a relevant case for this research as they can provide insights into governance approaches to climate adaptation and possible barriers and opportunities.

The decision to select cases within The Netherlands has also been to some extent pragmatic, as the research is funded by the Dutch research program 'Knowledge for Climate', theme 4 'Climate Proof Cities' (see Appendix A). Some of the cases in the research are also 'hotspots' in this program. A hotspot is a stakeholder (for example a Dutch municipality) that in return for a financial contribution, participates in the program by raising questions concerning climate adaptation identified in policy practice and consequently, serves as a possible case study. Because these hotspots have direct access to new knowledge and research, they might not encounter certain barriers and opportunities (e.g. cognitive or technical). Furthermore, the hotspots already show willingness to adapt to climate change by participating in the program. To circumvent bias and self-selection (Janssen-Jansen and Tan 2014), two Dutch cases outside the research program (Westflank Haarlemmeer and Schieveste, Schiedam) and an international case (Philadelphia, USA) were also added to the case selection.

An international case was added to the research as a reference case. This is to say, it is a case to explore whether the developed understanding of mainstreaming can also be identified in cities outside of The Netherlands. For this, the City of Philadelphia has been selected. Philadelphia is an early adapter that has successfully organized municipal responses to climate adaptation (Bulkeley 2013, Castán Broto and Bulkeley 2013, Rosenzweig et al. 2010). The city accomplished this with limited funds while concurrently addressing socio-economic issues such as urban degeneration and poverty. Among climate adaptation researchers, the city is considered to be a good example that provides potential lessons for other cities. Contrary to the Anglo-Saxon system with its neo-liberal, market-infused ideologies, the Dutch system is generally identified as a social welfare state system, with the national government addressing social issues related to education, health, spatial planning and education. Yet given the continuing privatization of public services alongside an increased delegation of power and resources to municipalities this is now changing rapidly (Janssen-Jansen et al. 2012, Rijksoverheid 2013). The limited government and restricted public expenditure is likely to affect local climate adaptation resources, pushing private actors to take a more prominent role in the mainstreaming of climate adaptation (Keenan et al. 2014). As Philadelphia

has realized its municipal responses within a similar context of competing socio-economic issues on the political agenda, limited resources and including private actors in climate adaptation, it could offer relevant lessons for the Dutch context.

1.3.3 Research methods and data collection

A mixture of methods has been used to collect qualitative and quantitative data (see table 1.1). The selection of the methods was based on the conditions that they are complementary and facilitate triangulation. The application of multiple methods increases the validity of the research because data is collected from multiple sources and analyzed in various ways (Onwuegbuzie et al. 2011). Since the dissertation is a compilation of published and submitted articles, each chapter applies a different mixture of methods. Overall the research applies four different methods which are briefly described here – for a more elaborate explanation, see the individual chapters.

Desk research | A content analysis of policy and planning documents, reports, websites and newspaper articles was used in all cases. This was to gain insight into, for example, the framing of climate adaptation, the gained responses and the organizational structures of the various municipalities and projects studied.

Interviews | Almost 100 semi-structured interviews with key actors have been held during a period of two years (2011-2013). The interviews provided practical insights in possible barriers and opportunities that the actors had experienced

Table 1.1 | Overview of cases

	Cases (Municipalities)	Embedded cases (Adaptation responses)	Chapter	Data collection methods per case
Hotspots	Amsterdam	* Amsterdam Waterproof * WATERgraafsmeer * Water retention road - Stephensonstraat - Burmanstraat - Betondorp	3, 4, 5	* Policy document analysis * Interviews * Q method / focus groups * Workshop
	Rotterdam	* Rotterdam Climate Initiative (RCI) * Rotterdam Adaptation Strategy (RAS) * Water plaza	3, 4	* Policy document analysis * Interviews * Q method / focus groups
	The Hague		3	* Interviews * Q method / focus groups
Other cases	Schiedam	* Schieveste	2	* Policy document analysis * Interviews
	Haarlemmermeer	* Westflank	2	* Policy document analysis * Interviews * Workshop
	Philadelphia (USA)	* Greenworks * Green City, Clean Waters	6	* Policy document analysis * Interviews

when addressing climate adaptation. The selection of interviewees was done by scanning policy documents, via connections provided by the Climate Proof Cities consortium[3] and through snowball sampling. Interviews have been digitally recorded, transcribed and stored by the researcher[4]. Interviewees have been assured confidentiality, implying that if they are quoted, only their job position but no other personal information would be revealed.

Q method and focus groups | The Q method has been applied in Chapter 3 to identify and explain patterns in organizational values concerning climate adaptation within three Dutch municipalities. This method provides a structural model for data collection and quantitative analysis, and allows for a qualitative evaluation (Wolsink and Breukers 2010). The latter has been made through interviews and focus groups. During the focus groups, the value patterns were presented to the respondents, who were allowed to give their feedback and provide possible explanations for the dominant value patterns in their municipality. These focus groups were always conducted by two researchers: a chairman and an observer. Both were allowed to ask for clarifications. The focus groups have also been recorded and transcribed.

Workshops | Two workshops have been attended. These were organized by actors who were working on climate adaptation projects. No questions were asked by the researcher during these workshops, the task of the researcher was to purely observe.

1.4 OUTLINE OF THE DISSERTATION

The PhD dissertation consists of five articles. Although the research questions posed in the articles do not entirely correspond to the main research questions, these five articles conjointly contribute to addressing the four research questions.

Chapter two introduces the conceptual framework that provides an initial understanding of mainstreaming including possible barriers and opportunities and indicators for evaluation. Accordingly, the conceptual framework is applied throughout the following four chapters (3-6). Individually, each chapter also addresses specific barriers and opportunities. Chapter three addresses possible barriers and opportunities affiliated with the understanding phase of

[3] See Appendix A

[4] If interviewees did not want their interview recorded, a report was made by the researcher and verified by the interviewee. In the case that the interviewees explicitly asked to see the transcription of the interview, it was sent to them for verification. Also, when the researcher had questions after the interview, it was checked with the interviewee via e-mail.

the policy phase by identifying the organizational values present in several municipal policy departments. In Chapter four, the nature of political commitment in the dedicated and mainstreaming approach is explored as the extent of commitment can influence the planning of municipal responses. Chapter five explores the role of organizational routines as possible barriers in the implementation (managing) phase. Accordingly, the Philadelphia case is used in Chapter six to identify stimuli that trigger climate adaptation in cities and to explore to what extent these stimuli can influence the governance approach to climate adaptation. Finally, Chapter seven functions as an epilogue that consists of a discussion of the main findings based on the four research questions, a reflection on this research, recommendations for future research, a paragraph on knowledge valorization, and some final thoughts.

CHAPTER 2 | Mainstreaming climate adaptation into urban planning overcoming barriers, seizing opportunities and evaluating the results in two Dutch case studies

Abstract | *With cities facing climate change, climate adaptation is necessary to reduce risks such as heat stress and flooding and maintain the goals of sustainable urban development. In climate change literature, the focus has been on developing a new dedicated policy domain for climate adaptation. Yet, empirical evidence shows that in practice actors are searching for solutions that not only serve climate adaptation, but integrate the adaptation objective in existing policy domains (e.g., urban planning, water management, public health). The integration of adaptation in other policy domains, also called 'mainstreaming climate adaptation', can stimulate the effectiveness of policy making through combining objectives, increase efficient use of human and financial resources and ensure long-term sustainable investments. A better understanding of the process of mainstreaming is, however, lacking. The chapter introduces a conceptual model for mainstreaming climate adaptation to enhance our understanding of the concept as well as the barriers and opportunities that influence these integration processes and to explore strategies for overcoming barriers and creating opportunities. Two Dutch case studies - related to urban planning - are used to illustrate the value of the model. The cases demonstrate the dynamic process of mainstreaming and raise discussion of the appropriate criteria to evaluate mainstreaming in relation to the aims of climate adaptation. The chapter concludes with an exploration of specific strategies to facilitate the mainstreaming of adaptation in existing and new policy domains.*

Published as | 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.

2.1 INTRODUCTION

Adaptation to climate change is considered necessary to reduce climate-related risks such as increased risk of heat stress, flooding and drought as these risks can result in social disruption, property damage and significant loss of life (Blanco et al. 2009, IPCC 2007, Hunt and Watkiss 2007). In practice, the implementation of adaptation measures has been slow (Runhaar et al. 2012, Bassett and Shandas 2010, Susskind 2010, Bulkeley 2009, 2010). The limited adaptation to climate change results less from the lack of knowledge of the necessary measures than from the difficulties related to the governance of the implementation of these measures. Climate change literature often assumes that governance of climate adaptation[5] requires a new dedicated policy domain (e.g. Moser and Ekstrom 2010, Grothmann and Pat 2005, Klein et al. 1999, Risbey et al. 1999). In such a dedicated domain, the main objective is to address adverse effects of climate change by achieving a particular degree of adaptation, ultimately aimed at being climate-proof. A dedicated policy domain for climate adaptation would imply that there are resources, objectives and a formal distribution of responsibilities for climate adaptation. This would help overcome the institutional void that has been observed in many countries (Biesbroek et al. 2009a, Swart et al. 2009). But empirical studies have shown that the preferred strategy in practice is not to opt for processes (or measures) that only serve climate adaptation issues, but to invest in more comprehensive solutions (Herrfahrdt-Pähle 2012, Berrang-Ford et al. 2011, Larsen 2011, Otto-Banaszak et al. 2010, Matzarakis and Endler 2010, Tompkins et al. 2010, Swart and Raes 2007, Adger et al. 2005). This relates to the process of 'mainstreaming climate adaptation'. This process of integrating climate adaptation into other policy domains can increase the opportunities for innovations, and the effectiveness and efficiency of policy making (Kok and De Coninck 2007, Smit and Wandel 2006, Huq and Reid 2004, Huq et al. 2003).

Mainstreaming climate adaptation in the existing policy domains implies that actors have to consider the effects of climate change for their policy domain and decide on the implementation of measures to reduce the vulnerability to these climate effects in their policies. The more adaptation is integrated in functionally linked policy documents and processes, the better the chance for society to become 'climate-proof' (Mees and Driessen 2011, Kok and De

[5] Adaptation is usually defined as 'adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits mutual opportunities' (IPCC 2007: 869) Governing climate adaptation is frequently discussed in combination with adaptive governance. Adaptive governance literature emphasizes, among other things, the complexity of governing societal problems such as climate change due to inherent uncertainties. This requires an adaptive (i.e. flexible and incremental) way of governing (see e.g. Herrfarhdt-Pähle 2012, Folke et al. 2005). In this paper, we consider adaptation first and foremost in line with the above definition and less in terms of adaptive governance, because the paper focuses on the practical implementation of adaptation measures. Some of these measures however might be considered as examples of adaptive governance. For example, the implementation of „no regret'' measures such as green roofs that act as water storage facilities irrespective of how precipitation patterns may change and have additional benefits, such as insulation.

Coninck 2007). Although several researchers promote the mainstreaming of climate adaptation only few researchers explain how to understand this integration process and more important, how to evaluate mainstreaming.

The aim of this chapter is to enhance the understanding of the process of integration of climate adaptation into other policy domains, to gain insights in the barriers and opportunities that influence this mainstreaming process and explore strategies to overcome these barriers and create opportunities. We focus specifically on urban planning, because cities experience direct impact from the effects of climate change and synergies between climate policy and sustainable development become most obvious at local level (Bulkeley 2010, Kern and Alber 2008). Urban planning can be used to generate social and technological innovations that support adaptation to climate change (Wheeler et al. 2009, Blanco et al 2009). Furthermore, urban planning is familiar with the integration of multiple objectives and could therefore provide additional insights.

In the following section, the concept of mainstreaming climate adaptation is explained by means of three questions: what is it, what can influence the mainstreaming process and how should mainstreaming be evaluated? Based on this, we have developed a conceptual model that is specially designed to capture the process of mainstreaming adaptation. In Section 2.4, two Dutch case studies related to urban planning are introduced and used to illustrate the process. We continue in Section 2.5 with a reflection on the conceptual model using findings of the case studies. The conclusion and discussion section comprises the implications that the adjustments to the conceptual model may have for mainstreaming climate adaptation in urban planning and other policy domains.

2.2 AN INTRODUCTION TO MAINSTREAMING CLIMATE ADAPTATION

2.2.1 Mainstreaming climate adaptation: what is it?

In the literature on climate change, the integration of climate adaptation policies and measures into sectoral planning and decision-making processes is referred to as mainstreaming (Bouwer and Aerts 2006, Huq et al. 2003). According to Klein et al. (2007 p. 25), mainstreaming climate adaptation ensures the long-term sustainability of investments and reduces the sensitivity of development activities to today's and future climate. Smit and Wandel (2006) support this assertion by saying that mainstreaming is an opportunity to adopt practical adaptation initiatives that can increase the adaptive capacity of urban systems. Moreover, mainstreaming leads to a holistic rather than sectoral engagement and encourages a more efficient and effective use of financial and human resources (Schipper and Pelling 2006, Klein et al. 2007).

Schipper and Pelling (2006) argue that mainstreaming implies the integration of awareness of future climate change impacts into existing and future policies

and plans. Klein et al (2007) agree to a certain level with Schipper and Pelling as mainstreaming aims at building capacity, but also focus on facilitating action. Policy domains are supposed to act by adapting to the expected changes in climate. For example, actors in planning processes need to understand the consequences of new development for the water storage in the development area and act upon it in their planning processes. Another example is the domain of public health. As overflowing sewers could have a detrimental effect on the health of citizens, it is important this is communicated to the society, and – if necessary – taken into account during decision- making on investments to increase the capacity of the sewer system.

As a starting point for the conceptualization of mainstreaming of climate adaptation, we draw from literature on environmental policy integration (EPI), which focuses on the inclusion of environmental objectives in existing policy domains (e.g. Lafferty and Hovden 2003). We consider mainstreaming of adaptation in other policy sectors a specific form of EPI. The four indicators for environmental policy integration proposed by Kivimaa and Mickwitz (2006) – inclusion, consistency, weighting, and reporting – are used to analyze the extent to which adaptation is mainstreamed. The first indicator of inclusion means that the issue is included in the policy process by referring to an issue and the related risks. Consistency translates into a shared understanding of the issue – both impact and measures – among actors, in policy documents or in policies in general. Weighting refers to the priority given to the issue in relation to the other objectives involved. Reporting refers to strategies and specifications for the implementation of adaptation, both ex ante and ex post (Kivimaa and Mickwitz 2006 p.732). The ex-ante reporting includes specifications and strategies regarding the distribution of responsibilities and the allocation of resources. The ex post reporting includes evaluation in the form of feedback that could stimulate a learning process (Sterman 2011, Moser and Ekstrom 2010). Kivimaa and Mickwitz (2006) point out that at least inclusion is necessary for the other three criteria to exist.

2.2.2 Barriers to and opportunities for mainstreaming climate adaptation

Barriers to or limitations for climate adaptation in general have been widely discussed in the climate change literature (e.g. Heinrichs et al. 2009, Adger et al. 2009a 2009b, Jordan et al. 2010). Barriers can delay the implementation of adaptation measures or exclude the issue from the policy process. Hence, barriers can influence the extent to which climate adaptation is mainstreamed. Most of these barriers can be classified within the framework described by Adger et al. (2007), encompassing five types of barriers to climate adaptation: first, ecological and physical limits[6] related to the possible limited adaptive capacity of natural systems; second, technological barriers related to the possible

[6] Adger et al. (2007 p.733) draw a distinction between limitations and barriers. Limitations are largely insurmountable, while barriers can be overcome.

incapability of technologies to be transferable as well as some technologies might be thought to be cultural undesirable or economically infeasible; third, financial barriers that refer overall to the lack of resources for both addressing adaptation and possible damage; fourth, informational and cognitive barriers related to the uncertainty, complexity and lack of knowledge regarding the topic of climate change and the need for adaptation; finally, social and cultural barriers resulting from the differences in the worldviews, values, and beliefs of individuals or groups.

With this categorization, Adger et al. (2007) provide a general overview of possible barriers to climate adaptation without specifying barriers for different government levels or policy domains, or giving insights into when these barriers could occur. Furthermore, the barriers are much related to climate adaptation and less to the process of mainstreaming. Moser and Ekstrom (2010) provide an alternative and more nuanced categorization as they present an overview in which possible barriers are linked to phases of the policy process and additionally, include barriers related to the institutional context of the policy process. Such institutional barriers are not necessarily related exclusively to climate adaptation (Lorenzoni and Hulme 2009, Biesbroek et al. 2009a). Examples of such institutional barriers are incompetent leadership, a lack of political support, no public pressure and the competition of other objectives in the policy process – a significant barrier in case of mainstreaming adaptation. This category also includes organizational barriers such as fragmentation, lack of coordination and organizational cultures (e.g. van den Brink, 2009). The category of organizational/ institutional barriers is an addition to those identified by Adger et al. (2007).

Within policy processes, climate adaptation will encounter not only barriers, but also opportunities, such as available resources, political and public support or pressure, leadership, financial subsidies, innovative actor collaboration, and even past calamities as these may trigger awareness or urgency (Füssel and Klein 2004, Jordan et al. 2010, Bedworth and Hanak 2010, Bulkeley 2010, Tompkins et al. 2010). Many of the barriers mentioned above could also be interpreted as opportunities implying that leadership can be in favor of or against climate adaptation or that the presence of other objectives can lead to competition but also the opportunity of integration through goal intertwinement. Thus, the policy process including climate adaptation can expect barriers and opportunities that are social, cognitive, financial, technological and organizational/ institutional in nature. In this adjusted categorization the ecological and physical barriers are part of the technological category since environmental and physical limitations have been previously overcome by innovative technologies (Moser and Ekstrom 2010).

In addition to the categorization, Moser and Ekstrom (2010) provide a framework in which certain barriers and opportunities are linked to the three

common phases of a policy process. The first phase of a policy process focuses on 'understanding'; barriers and opportunities that occur during this phase are in general social, cognitive, and organizational/ institutional in nature. The second phase relates to 'planning', in which financial, technological, and organizational/ institutional barriers generally arise. 'Managing' is the final phase, in which the barriers and opportunities are mostly financial and organizational/ institutional. Moser and Ekstrom (2010 p.2) point out that some of the barriers and opportunities crosscut throughout the process and might reoccur in a later phase. Additionally, the policy process is iterative and not linear. This implies that barriers and opportunities from an earlier phase could repeat themselves as the policy process progresses.

2.2.3 Evaluating mainstreaming climate adaptation

Thus far, the chapter has established how to observe or measure mainstreaming climate adaptation and what could influence the mainstreaming process. A question not yet addressed considers the 'successfulness' of mainstreaming climate adaptation: how to evaluate the mainstreaming of climate adaptation? Although the literature contains a variety of approaches to policy evaluation (e.g. process-based evaluations addressing legitimacy, transparency and other criteria associated with 'good governance' (e.g. Rauschmayer et al.2009) versus substance-based evaluations addressing for instance the problem-solving capacity of policies (e.g. Fischer 1997), here we focus on the outcomes of the adaptation process in the light of the mainstreaming objectives. This is what usually is referred to as an 'effectiveness evaluation' (Rossi et al. 2004). Mainstreaming aims to stimulate efficient and effective use of financial and human resources by integrating climate adaptation in another policy domain (Klein et al. 2007). The goal of adapting to climate change is to become 'climate-proof' which ideally requires the reduction of the vulnerability to climate change impacts, to zero (Schipper 2007 p.3). Combining the goal of climate adaptation with the aim of mainstreaming would prove difficult. Because, first, as a result of several uncertainties on the rate and magnitude of climate impacts it will be difficult to establish the amount of measures necessary to achieve the 'zero' norm. Furthermore, in case of mainstreaming, the inclusion of adaptation in the decision making processes of the policy domain most likely results in trade-offs between climate adaptation and the policy objectives of that domain (Kok and De Coninck 2007). Such trade-offs can complicate the achievement of reaching the norm of being 'fully' climate-proof. Kabat et al. (2005) support this by stating that reducing climate-based risks to zero is an unrealistic goal. They introduce the 'climate-proofing' approach in which climate adaptation decisions "should be driven by opportunities for technological, institutional and societal innovations rather than purely by the fear of negative effects of climate change" (Kabat et al. 2005 p. 283).

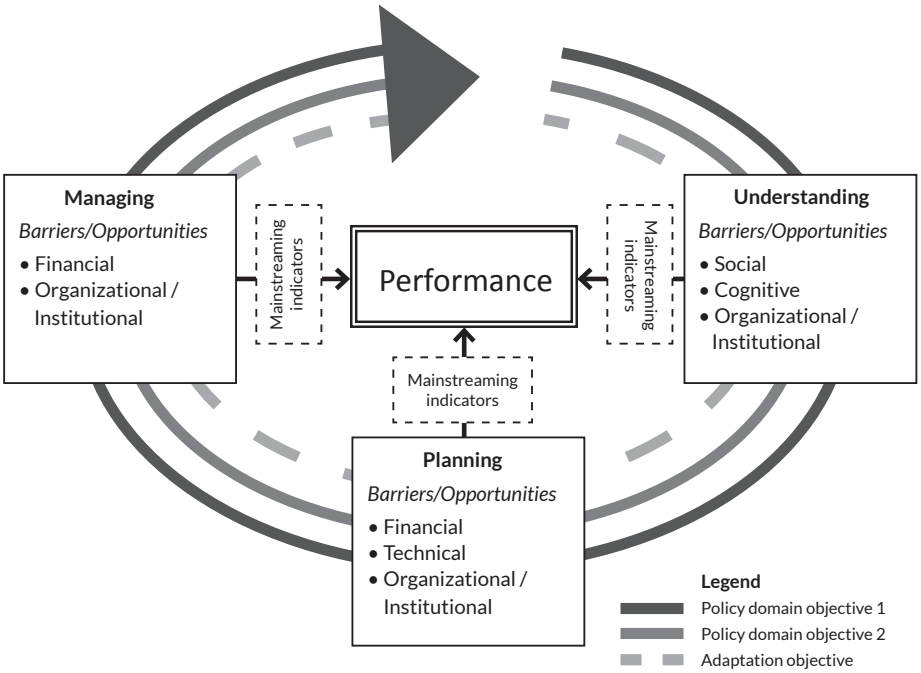
This is in line with a discussion held in planning literature on whether to evaluate strategic plans based on their 'conformance' or 'performance' (Faludi 2000, Mastop and Faludi 1997). Conformance involves the concurrence between outcome and intentions; the implementation of norms without further consideration. Performance, on the other hand, refers to the extent that a plan or objective is included and affects future decision making. Faludi (2000) points out that in the case of the presence of multiple objectives, the focus should be on performance rather than conformance. Performance gives the actor the possibility to assess the situation in relation to the strategic plan and appoint valid solutions that fit the context (Faludi 2000). Within this reasoning, a lack of conformance does not imply poor performance, but rather indicates deliberate decision making (Faludi 2000). Since mainstreaming aims to address multiple objectives within one policy process or plan, it equally requires evaluation based on performance. As indicated above, during the process the focus needs to be on feasibility and not on the outcome. The responsibility for climate adaptation lies with the actors in the process as they decide on the approach, the extent and the allocation of resources based on what is financially, socially and technologically feasible. However, either ignoring adaptation in the planning process or implementing norms without understanding their relevance is assessed as unsuccessful mainstreaming.

2.2.4 Synthesis: a conceptual model of mainstreaming climate adaptation

Based on the previous paragraphs, we developed a conceptual model of mainstreaming climate adaptation (figure 2.1). The model is based on Moser and Edstrom's (2010) analytic framework for the adaptation process, Kivimaa and Mickwitz's (2006) four indicators to measure whether and to what extent climate adaptation is mainstreamed (in the model referred to as mainstreaming indicators) and Faludi's (2000) concepts of conformance and performance to evaluate the outcome of the mainstreaming process. We expanded the model by conceptualizing the policy process as one aiming at multiple objectives with which adaptation has to be mainstreamed. Additionally, the barriers and opportunities are clustered into types (social, cognitive financial, technological and organizational/ institutional) and linked to policy phases.

In view of this conceptual model, we hypothesized that if the issue of climate adaptation is included in the policy process in an early stage, it is likely that – given consistency and weight - the implementation of an adaptation measure or strategy (reporting) will occur. We assumed however that on the one hand barriers created by other objectives can lead to the postponement or exclusion of climate adaptation. On the other hand, we expected opportunities for adaptation when its objectives are linked to other objectives in the policy process. Thus, second, we hypothesized that barriers and opportunities related to these other objectives might influence the mainstreaming of climate adaptation.

Figure 2.1 | Conceptual model for mainstreaming climate adaptation



Third, we assume a focus on performance as opposed to conformance increases the changes for mainstreaming climate adaptation. By presenting a strict norm for climate adaptation, the focus tends to fixate on achieving the norm, while supposedly it should be on finding synergies between sectoral goals and adaptation goals; that is the feasibility of climate adaptation measures. Hence, we hypothesized that performance-based decision making leads to a more successful outcome for mainstreaming climate adaptation than conformance-based decision making.

2.3 TESTING THE APPLICABILITY OF THE MODEL

Two case studies were conducted in order to illustrate the model and to check its applicability. We have concentrated on practices in the Netherlands, because it is renowned for its planning system as well as its experience with the integration of environmental policy and urban planning (Runhaar et al. 2009, Miller and de Roo 2004, Wheeler and Beatley 2004). Moreover, the Netherlands has a clear need to adapt to climate change, partly because large parts of the country are flood-prone. The Dutch urban landscape needs to be adapted to the expected changes in precipitation patterns and sea level rise resulting from climate change (CROW 2010, RIONED 2007). But increasing temperature could also trouble the Dutch urban water systems as drought in low lying areas can lead to salinization and soil subsidence (PBL 2009). We have selected two planning projects that address at least one of these climate risks through the

mainstreaming of climate adaptation. Given the nature of the research we selected projects that were ongoing. Elsewise the cases were allowed to differ (see table 2.1 for a characterization). The cases are illustrative rather than representative as the main goal is to show and preliminarily test the value of our conceptual model.

Interviews with key actors in the planning processes and planning documents were used to create a reconstruction of the phases of the planning processes (see Appendix B for list of interviewees and planning documents). During the semi-structured interviews, the key actors were asked to give their understanding of climate adaptation and how they considered climate adaptation was mainstreamed in the project. Accordingly, they were asked to reconstruct the planning process and list barriers and opportunities that had influenced the development of the adaptation measure during the process. In case of Westflank, additional information was gathered from a workshop[7] in which three out of four actors participated. The planning documents were analyzed on content and linked to the three policy phases so as to make a comparable reconstruction (see figure 2.2).

Table 2.1 | Brief characterization of the case studies

	Case study: Schieveste	**Case study: Westflank**
Municipality, province	Schiedam, South Holland	Haarlemmermeer, North Holland
Size	16 ha	3,000 ha of which 1,560 ha for new development
Plan	Offices, (maybe) housing	Housing, recreation, green infrastructure, water system
Actors	Plan by municipality; advised by water board and consultant	Plan by municipality, province, national government and water board
Time period	2001-present	2006-2011
Status	Implementation	On hold because of possible construction of energy cable
Type of adaptation	Water storage underground	Detention pond and retention pond

Figure 2.2 | Operationalization of policy phases by means of planning documents

Understanding	**Planning**	**Management**
Documents including first intentions or conceptualization	Documents presenting alternatives or including technical, financial or environmental considerations	Development agreements or maintenance plans

[7] The workshop was commissioned by the national government and organized by the Dutch consultancy firm Grontmij and Erasmus University Rotterdam.

2.4 ADAPTATION IN TWO DUTCH PLANNING PROCESSES

2.4.1 Schieveste

'Schieveste' is a transformation project focusing on the development of an office location (350.000 sqm) in the middle of the municipality of Schiedam, the largest transit hub after Rotterdam in the province of South Holland. Besides offices, the project aims to accommodate housing, education, and leisure functions. An underground water storage system and building codes requiring new buildings to install their own water storage systems were selected as adaptation measures, because the plan envisions a densely-built plan with insufficient storage capacity for water. This situation could lead to water nuisance and damage to the built infrastructure.

Understanding phase | In 2001, the municipality presented a planning document that included the initiative to develop the land between the highway and the train tracks. The initial planning document concerned the ambitions for the area and included a program for "a new, multi-functional location with unique accessibility" (Municipality of Schiedam 2002 p. 5). In this planning document, there are no explicit ambitions regarding water storage or climate adaptation.

Planning phase | In 2002, the municipality published a master plan for the project (Municipality of Schiedam 2002). The master plan held the intention to fully exploit the land. National spatial policy requires all initiators with development plans to apply a Water Test[8] in which the initiator explains how the norms for water safety, quality, and quantity will be satisfied. The content of this Water Test is in general first discussed with the governmental authority for water issues in the area, the Water Board. The Water Board gives an advice on the preservation of the water system which is based on administrative norms. For Schieveste the norms entailed the inclusion of water storage capacity of at least 325 cubic meters per hectare. For the project, the Water Test was the initial incentive for including an adaptation measure since the assessment highlighted the insufficient storage capacity. The Water Board said on this "that early in the process, it was pretty clear that due to the position and altitude of the area, the type of buildings and the amount of cables and pipelines underground; surface water facilities were not an option" (interview SD4[9]). Nevertheless, the municipality submitted several plans ranging from exclusively surface water facilities to combined systems with surrounding neighborhoods, to the Water Board. The plans were evaluated on financial viability and technical issues such as capacity, discharge norms and maintenance.

[8]The 'Water Test' is an administrative agreement and resembles a sort of environmental impact assessment for the water system.

[9]Each interviewee is given a code of a letter and a number. The letter indicates an actor in the case: SD = Schiedam and WF = Westflank. A list of interviewees can be found in Appendix B.

"Various solutions have been discussed and many letters have been sent back and forth. The municipality sends something in and the Water Board then rejected the plan" (interview SD4). One of the municipal staff indicated that some of the municipal planners did not consider seriously the norms advised by the Water Board since these were much higher than the minimum legal norm[10] (social and cognitive barrier): "by shifting around the norms doing a bit more here and less there, they thought it would be enough. This was of course nonsense" (interview SD2). Furthermore, the municipality thought that they were only responsible for the implementation of the water storage and not the maintenance so they opted for lesser and cheaper solutions (organizational/ institutional barrier). Thus far there was no consistency on the type of measure or norms for storage capacity between the municipality and the Water Board.

Managing phase | Between 2008 and 2010, the first clients had presented themselves for settlement in Schieveste and the first building in the area was completed. The presence of the clients put pressure on the municipality to secure the development and therewith the need for a decision regarding the construction of the water storage (organizational/ institutional opportunity). But a solution for the insufficient storage capacity had not yet been found. The selection of the adaptation measure was difficult because many alternatives were technically inadequate or financially unfeasible.

In the same period, the municipality appointed a new project manager and civil engineer and the Water Board also re-assigned the Schieveste case. This shift in representatives within the actor constellation (organizational/ institutional opportunity) led to the relinquishing of former ideas and inspired fresh input (social and cognitive opportunities). The civil engineer said: "when I arrived I looked at the former plans and did not think they were a good idea, because the former plan linked two neighborhoods with different altitudes. The difference in altitude complicated the water flow between the two areas" (interview SD2) (technical barrier).The alternative was to develop water storage underground. The new advisor of the Water Board was asked to accept the latest plan for the underground water storage which the municipality had designed beneath the main road in Schieveste. With the second client arriving in the area, the municipality wanted the infrastructure in place (organizational/ institutional opportunity). Linking the infrastructure with the underground water storage in design had established indirect weight to the measure.

The advisor of the Water Board had to reconsider the allocation of responsibilities for implementation and maintenance: "The municipality said we develop

[10]The norms are based on the ABC storage norms. These norms imply that in the case of urban areas 325 m3/ha water storage should be applied. This figure is based on 50 percent hard surface. In the case of Schieveste, the Water Board used a higher percentage of 80 to 90 percent hard surface, advising 550 m3/ha of water storage. In addition, the Water Board added 10 percent for climate change and 10 percent for the coastal effect (Hoogheemraadschap van Delfland 2005).

the storage and the Water Board maintains it. We had to consider this as the Water Test asked for surface water, but the municipality chose not to develop surface water" (interview SD4). Hence, when in 2009 the municipality decided on the technical solution, they learned from the Water Board that a water storage underground meant that the municipality was also responsible for the maintenance and thereby the possible damage resulting from future water nuisance (organizational/ institutional barrier). At that point, the municipality perceived that the norms set by the Water Board were substantive (cognitive opportunity). Accepting the norms created consistency, while the clarification in the distribution of responsibilities established weight.

Although decided on the type of solution, some of the municipal staff – including the maintenance department – still had to be convinced that the final measure was efficient as well as effective as the selected adaptation measure was fairly new and had rarely been applied elsewhere. They did not want to be the 'guinea pig'; "it is the first time that this systems is implemented and the Water Board does not want to take responsibility for it. Maybe that says something. The decision makers have to hear the maintenance department concerns and try to reassure us" (interview SD3). This social and cognitive barrier was overcome by additional investments in safety features.

Simultaneously, another discussion was held within the municipality concerning when to realize the water storage. The municipality had budgetary problems and the option of postponing the construction was appealing (financial barrier). But because of the placement of the water storage under the main infrastructure, this delay would imply the postponement of the construction of significant infrastructure. The municipality recognized the significance of having infrastructure in place for future clients and the inconvenience for the clients that were already settled: "it is important to be attractive for businesses when the economy recovers as well as that you do not want your current clients working in a construction site" (interview SD1).

In the beginning of 2011, 30 percent of the planned water storage was implemented. The rest of the storage capacity will be realized concurrent with development of the buildings planned at those locations. Complementarily, the

Table 2.2 | The occurrence of barriers to and opportunities for mainstreaming climate adaptation during the policy process of Schieveste

	Understanding phase		**Planning phase**		**Managing phase**	
	Barrier	*Opportunity*	*Barrier*	*Opportunity*	*Barrier*	*Opportunity*
Social			(1)		(1)	
Cognitive			(1)		(1)	(1)
Organizational/institutional			(1)			(3)
Financial					(1)	
Technological					(1)	

(x) number of perceived barriers and opportunities

municipality has developed design guidelines that require new clients to incorporate water storage in their buildings. The implementation of a water storage phased over time and design guidelines serving climate adaptation is considered the ex-ante reporting. Ex post reporting has not been done yet. Table 2.2 shows an overview of the occurrence of the barriers and opportunities during the policy phases.

2.4.2 Westflank

In the Netherlands, the Westflank plan is seen as a comprehensive area development in the Haarlemmermeer polder. The Amsterdam airport, Schiphol, is situated in this polder in the province of North Holland. The project consists of the development of houses, recreational areas, green infrastructure, and an improved road network (Rijksoverheid 2009a). To create a self-sufficient and climate-proof water system the plan included the construction of both a retention pond (2 million m3) and a detention pond (1 million m3) (Governmental platform 2010). These adaptation measures are necessary to circumvent flooding in the case of excessive precipitation and salinization, and the subsidence of buildings in times of drought.

Understanding phase | In 2006, Westflank was part of a vision for the regional plan (Provinces of North and South Holland 2006), which had already reported the need for the detention and retention ponds (social/cognitive opportunity). The adaptation measures were hence included from the start of the policy process. A year later, Westflank, owing to its proximity to the airport, was incorporated in a national program that focused on improving the economic position of the Randstad area (Rijksoverheid 2007). It was important to create consistency in the plans as "the decision making on the growth of Schiphol (changes of or expansion in flight routes) could directly influence the development possibilities in the Westflank Haarlemmermeer" (Rijksoverheid 2009b). This step was followed by an agreement in which four actors (Haarlemmermeer municipality, North Holland province, Rijnland Water Board, and the national government) agreed to develop Westflank based on two main goals: first, to strengthen the international position of Schiphol airport and second, to develop a sustainable water system that addressed current and future barriers caused by climate change (Governmental Platform 2010). In this way, the actors assigned weight to the issue. Consistency was evenly determined in the actors' agreement as they maintained the norms regarding the size of earlier planning documents (organizational/ institutional opportunity).

In 2009, the actors constructed a more detailed plan that included the requirements for the area development, also known as the 'conceptual program of requirements' (Governmental Platform 2010). Based on this plan, the actors performed a cost benefit analysis (CBA), which was required for appealing to a national funding budget for spatial development. The CBA conclusion was negative mainly because of the inclusion of the retention pond (PBL 2010). The

negative outcome was explained by the high ambitions for the water system. "Combining a retention pond with housing would lead to higher costs; the water level in the area could not be lowered too much which meant that the retention pond would reduce in effectiveness" (PBL 2010) (financial barrier). The Water Board however points out that there was also the inability of monetizing some of the benefits of the water system (cognitive barrier): "It was a negative outcome, but it did not include the benefits related to water quality. So of course the outcome was negative. Accordingly, we had to tell a convincing story to the decision makers that the project was worthy of the national funding budget. (…) This we could as it was an innovative project: a climate-proof plan on such a scale had never been realized before" (interview WF1). Apparently the Water Board was successful because the national government granted the national budget, referring to the societal relevance of the project (social opportunity). The budget created a financial opportunity to continue with the plan for the retention pond.

Planning phase | During 2010 the actors continued designing the retention pond. There were only a few locations where it could be placed because of the soil in Westflank (Rijksoverheid 2009a). In addition, fitting a pond of such size in the planning area without requiring replacement of the existing infrastructure was technically difficult (interview WF2). But as replacement would imply additional investments, the alternative of a smaller pond without infrastructure replacement was chosen. Several actors questioned however whether a retention pond of this size would still create a sustainable water system and if not, was the investment worthwhile (cognitive barrier) (Grontmij et al. 2011). This shows that for some actors the weight for the adaptation was diminishing. Another barrier was that the national budget and exploitation revenue would not cover the costs which meant that additional public funding was needed for realizing the retention pond. This had already been clear after the national funding budget had been granted as the ambassador of the project had said that "the budget is a good start, but more resources are necessary to realize these ambitious plans" (Randstad Urgent 2009). But although the actors had all agreed to the objective of creating a climate-proof water system, they did not want to take on the financial responsibility (financial and organizational/ institutional barrier). It was expected that the Water Board would pay for the implementation of the retention pond because they had financed the detention pond – this because it was their legal task and the detention pond would be developed even without the development of the Westflank. But the Water Board was unwilling to finance the retention pond since legally it was not their task (organizational/ institutional barrier) (Grontmij et al. 2011). Moreover, they were afraid that agreement would act as a precedent for future projects (interview WF1). Later, the Water Board yielded by taking responsibility for the maintenance of the pond, but this was not enough for the other actors (workshop WF2). They argued: "if you want to make decisions, you need to pay" (interview WF1).

At the end of 2010, the actors were pressured to sort out the complications as the national budget would be withdrawn without an agreement on the financial commitment of the actors. None of them, however, were willing to invest. The national government had already granted the national funding budget and the Water Board would pay for the maintenance. The municipality was not interested in having a sustainable water system, and the province stated that this investment did not solve any of their problems but those of others (workshop WF2). Finally, the province stepped up to the plate by taking on the financial responsibility: not funding the pond, but offering to seek investors. The pressure of the withdrawal of the national budget could be considered an opportunity since the province finally agreed to take managerial responsibility.

By that time, the national government was concurrently deciding on the trajectory for an electricity power line (380kv) which would either go through or past Westflank. For the province and the municipality, the construction of the 380kv through Westflank meant the end of the plans for the area. They considered that the project could not achieve the same level of sustainability with the 380kv situated in the area. This position was opposed to that of the national government, who was willing to continue the project independent of the outcome (Grontmij et al. 2011). In 2010, the national government announced the placement of the 380kv through the Westflank, which led to a temporary suspension of the planning process (organizational/ institutional barrier) and a disparate vision for the Westflank among the actors (social and organizational/ institutional barrier) (Grontmij et al. 2011). In table 2.3, the barriers and opportunities concerning the mainstreaming of adaptation are arranged by type and linked to the appropriate policy phase.

2.5 COMPARATIVE ANALYSIS

As indicated before the two cases are illustrative rather than representative. Nevertheless, they yield two insights that are interesting in the light of our hypotheses. First, the hypothesis that when inclusion, weight and consistency were established in the policy process, the implementation of adaptation measures would be more likely was not supported by the cases. The Westflank case started initially with weight and consistency for adaptation, but this weakened throughout the planning phase of the policy process. While the Schieveste case

Table 2.3 | The occurrence of barriers to and opportunities for mainstreaming

	Understanding phase		**Planning phase**	
	Barrier	*Opportunity*	*Barrier*	*Opportunity*
Social		(2)		
Cognitive	(1)	(1)	(1)	
Organizational/institutional		(1)	(2)	(1)
Financial	(1)	(1)	(1)	
Technological			(1)	

(x) number of perceived barriers or opportunities

developed consistency no earlier than in the managing phase and weight was indirectly given to the matter as a result of the position of the water storage under the main infrastructure. This difference can be explained by the timeline of the two cases: Schieveste started in 2001 and Westflank was initiated several years later. In 2001 climate change was not yet established topic and the Water Test, which in case of Schieveste, initiated the discussion about adaptation and promoted the inclusion of certain adaptation norms, was a new policy instrument at the time. The municipality addressed climate-related risks such as flooding in an early state, but did not label it as climate adaptation. Before, they had understood water nuisance as a risk that could impede sustainable development. At the start of Westflank, the Water Test had become established and climate change had arrived on the political agenda. Consequently, climate adaptation was a key objective from the beginning. However, this did not result in the implementation of adaptation measures. Hence, the cases only indicate that the extent of mainstreaming is constantly reconsidered. This illustrates the vulnerable position of climate adaptation in the policy process in case of mainstreaming as the integration of adaptation can be initiated, postponed or terminated in each policy phase.

Nevertheless, the Schieveste case showed that opportunities for potential synergies with other objectives in the policy process can occur and increase the performance of the mainstreaming process. On the other hand, the Westflank case illustrated that other objectives may form a barrier: due to the planned trajectory of the 380kv cable through Westflank actors questioned the opportunities for a sustainable development of the area and subsequently the policy process was put on hold. Both examples are in line with our second hypothesis; other objectives in the policy process can both form barriers and opportunities for adaptation.

This leads to a second insight: the difference in outcome is likely explained by the extent to which climate adaptation was mainstreamed. In the Schieveste case, the municipality questioned the norms given by the Water Board and accordingly, it chose to expand the norms and link adaptation measures to essential infrastructure and the construction of buildings through the building code. Westflank showed a different approach of integration. In spite of the inclusion of adaptation as key objective, the retention pond was viewed as solely an adaptation measure: a dedicated objective. Other qualities of the retention pond were supposedly ignored and the investment was only considered valuable if it would make the whole area climate-proof. Our research showed that the Westflank actors were mainstreaming with a conformance mindset; that is focusing on the outcome. As a result, until the project was put on hold, it had failed to effectively mainstream adaptation. Adversely, Schieveste is considered more successful in mainstreaming since adaptation is included in current (water storage underground) and future urban design (adaptation measures in new development due to building codes). Since the municipality did not have

climate-proofing as the ultimate aim, it had more flexibility in finding solutions to mainstream adaptation sufficiently (and in line with the Water Board advice) and resulting in good performance. Thus far these cases imply that performance-based decision making results most likely in 'successful' mainstreaming of climate adaptation.

In addition to these insights, three more points need to be considered that have influenced the mainstreaming of adaptation and could be specific for these cases. First, Westflank had a more complex institutional context than Schieveste. Two actors from two government levels (municipality and Water Board) influenced the mainstreaming, in contrast with the Westflank case where four actors from four different governmental organizations functioning on various spatial scales (local, provincial, national, and Water Board) had a say. Conceivably, the degree of institutional complexity influenced the progress of the two processes. Second, in Dutch planning processes, awareness of climate adaptation and specifically of water-related issues was triggered with the introduction of the Water Test. Other countries and policy domains might not have such an incentive. Third, although awareness of adaptation was triggered by the Water Test in these cases, the actors were not equally aware of all the climate risks. The Water Test focuses mainly on the water system and, even within Dutch water management, flooding is a more established risk than the risk of drought, as can be seen in the Westflank case. Hence, the perceived need for adaptation may differ (Runhaar et al. 2012).

2.6 CONCLUSIONS

In this chapter, we have further elaborated on the concept of mainstreaming climate adaptation into the policy domain of urban planning. The conceptual model that we developed distinguishes from existing models that conceptualize adaptation as a dedicated policy domain. These models often approach adaptation as a linear process with adaptation as main objective. The focus is often focused on conformance between adaptation norms and outcome.

In this chapter, we argued that a mainstreaming process is more dynamic. By applying our model on two Dutch case studies related to urban planning, it became clear that the implementation of adaptation measures is not evident in mainstreaming processes. The extent of mainstreaming is constantly reconsidered as a result of barriers and opportunities that derive from other objectives in the policy process. As a result of this dynamic character of the mainstreaming process, obtaining a climate-proof situation or conformance is hard to achieve. Therefore, it would make more sense to evaluate mainstreaming processes on their performance. This implies that actors need to apply strategies that focus on establishing synergies and making deliberate decisions that is taking into consideration current and future impacts. Table 2.4 characterizes the two approaches to the governance of climate adaptation.

Table 2.4 | Governance of climate adaptation: the dedicated versus the mainstreaming approach

A dedicated policy domain for adaptation	Mainstreaming adaptation into other policy domains
• Climate-proofing as the main objective • A linear policy process • Conformance to adaptation norms as criterion to assess policy outcomes	• Climate-proofing as one of the objectives • A dynamic policy process • Performance as criteria to assess policy outcomes

In order to further verify and refine our conceptual model we suggest it is applied to more cases in different countries encompassing other policy domains which might be affected by climate change (e.g. public health, infrastructure and water management). Simultaneously, it is relevant to expand the research on barriers to and opportunities for mainstreaming adaptation to increase the understanding of these processes. In particularly, it will be important to gain insight in the perceptions actors have in relation to climate adaptation and whether or not these views stimulate performance in the mainstreaming process. An increased understanding of these barriers and opportunities may lead to new strategies for promoting the mainstreaming of adaptation.

CHAPTER 3 | Organizational values and the implications for mainstreaming climate adaptation in Dutch municipalities: Using Q methodology

Abstract | *Mainstreaming climate adaptation requires the inclusion of climate adaptation in the policies of various policy domains such as water management and spatial planning. This chapter investigates the organizational values present in several municipal policy departments in order to explore their willingness to act upon climate adaptation and the implications for mainstreaming. Q methodology, supplemented by interviews and focus groups, applied in three major Dutch municipalities – Amsterdam, The Hague and Rotterdam - reveals three value patterns: (1) start today, (2) not for us to lead and (3) shared responsibility. These different value patterns indicate that there is a general agreement on the problem, impacts and solutions, but disagreement on the timeframe for action and the allocation of resources. Although all three value patterns are present within departments in each municipality, different value patterns prevail in each municipality. Additionally, the analysis shows barriers as well as opportunities for mainstreaming. A lack of political commitment and leadership, and unsupportive organizational structures create barriers. In spite of this, there is willingness to act, and strategic framing is applied to gain acceptance for the mainstreaming of climate adaptation.*

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3.1 INTRODUCTION

Worldwide, cities need to adapt to climate change risks in order to reduce possible negative effects, such as flooding, drought and heat stress (Kabat et al. 2005, Adger and Barnett 2009, Hunt and Watkiss 2011). If cities neglect to invest in climate adaptation today, they will most likely have to deal with the future costs of possible damage to urban systems and services. For example, (urban) flooding can result in nuisance, social disruption, material damage (Nilsen et al. 2011) and in more severe cases, health problems (Huynen et al. 2008). It has even been argued that these future costs of damages outweigh the current investments needed for cities to become 'climate-proof' (Tompkins et al. 2010, Runhaar et al. 2012). Several researchers have argued that municipalities have an important role as they can organize responses to local impacts, set up networks and manage the delivery of resources to facilitate climate adaptation (Agrawal 2008, Measham et al. 2011). Although the extent to which municipalities can fulfill this role is expected to differ as the impact of climate change and adaptive capacity varies locally (Hunt and Watkiss 2011), many are searching for ways to address climate adaptation in urban policy. Different ways to do this have been presented in academic literature. For example, municipalities can apply a dedicated approach in which they develop a specific strategy to address climate adaptation or a more integral approach in which climate adaptation is 'mainstreamed' – i.e. integrated – in existing policy domains (Kern and Alber 2008, Smit and Wandel 2006). The aim of mainstreaming is to find synergies between climate adaptation and existing policy objectives and to combine resources (Uittenbroek et al. 2013).

While the mainstreaming approach is often advocated by researchers, in practice, the integration of climate adaptation into the daily routines of policy domains that are expected to mainstream faces barriers (Uittenbroek et al. 2013). Most policy domains have no legal obligation to mainstream climate adaptation. This makes mainstreaming largely dependent on whether or not the policy departments of a municipality are willing to act upon climate adaptation. Hence, a crucial condition for mainstreaming is how these policy departments perceive and value the risks, urgency and responsibilities of climate adaptation. Until now, only limited research has been done on the role of organizational values with regards to climate adaptation policies of municipal departments. It is not known how these organizational values and potential variation of these values between policy departments within one municipality affect the mainstreaming of climate adaptation in urban policy.

Consequently, the aim of this chapter is: first, to identify patterns in organizational values on climate adaptation among the policy departments in three Dutch municipalities – Amsterdam, The Hague and Rotterdam; second, to explain the climate adaptation-related value patterns within the three municipalities, and third, to explore the implications of these value patterns for the

mainstreaming of climate adaptation. In this research, an organizational value is defined as a socially shared cognitive representation of problem definition and strategy regarding climate adaptation (Rokeach 1979). Q methodology was used to identify and reveal these patterns among the policy departments. This method provides a structural model for data collection and quantitative analysis, and allows for a qualitative evaluation (Wolsink and Breukers 2010). To interpret the value patterns within the municipalities, interviews and focus groups have been conducted to map and understand the organizational structures – i.e. the allocation of tasks and resources – of the three municipalities. We studied the organizational structures in addition to the values because we anticipated that the willingness to act is largely driven by how tasks and responsibilities for climate adaptation are allocated within a municipality (Hinings et al. 1996). The findings from the interviews and focus groups have also been used to substantiate our findings on the possible implications of the value patterns for mainstreaming.

The three Dutch municipalities have been selected on the following four criteria: all have experienced (urban) flooding, all have to deal with a calculated increase in extreme precipitation events induced by climate change, all are in the exploratory stage of how to act upon climate adaptation and all are participating in the Dutch research program Knowledge for Climate – indicating that all have access to the same information (Runhaar et al., 2012, Knowledge for Climate 2013). Although this chapter focuses on the organizational values within three Dutch municipalities, the research adds to existing literature by providing insight into the variety of organizational values concerning climate adaptation within a municipality and how this translates into both opportunities for and barriers to the mainstreaming of climate adaptation.

3.2 ANALYTICAL FRAMEWORK

The complexity of climate change and accordingly climate adaptation leads to various diverging interpretations of and opinions on the policies and actions needed for climate adaptation (e.g. Eisenack et al. 2007, Nisbet 2009, Weber and Stern 2011). Entman (1993) argues that an actor makes decisions based on a combination of opinions or values that generally relate to 'problem definition, causal interpretation, moral evaluation or/and treatment recommendation' (Entman 1993, p. 52). With these four elements, Entman (1993) provides an analytical framework which we apply in this research to illustrate the variation of possible values with respect to climate adaptation (see table 3.1).

The first element is the problem definition (problem) which in the case of climate adaptation translates into the question of whether or not the actor acknowledges the phenomenon of climate change and its associated risks such as sea level rise, higher temperatures and increase in precipitation. Even though a growing consensus exists in the scientific community on climate change as a

Table 3.1 | Analytical Framework

Elements	Values concerning
Problem	• acknowledgement of climate change
Impacts	• causes and consequences of climate change
Morality	• the allocation of responsibilities
	• the time frame for action
Solutions	• the selection of feasible and effective solutions

Source: Entman (1993) and operationalisation

result of natural and human activities (IPCC 2007), there are many gradations of acknowledgement of the issue in society at large. From actors who see climate change as an urgent problem because they find the existing scientific findings substantive enough for immediate action, to others who might have a more skeptical understanding of climate change possibly as a result of the existing uncertainty (Leiserowitz 2005). Therefore, they might not acknowledge the relation between climate change and the associated risks.

The second element, causal interpretation (impact), refers to evaluations of the impacts of climate change-related risks for society. The impact of climate change-related risks differs in rate and magnitude per area and some areas will be more vulnerable than others (Hunt and Watkiss 2011, Biesbroek et al. 2009b, Hulme 2009). For example, cities with more hard surfaces and less green could be more affected because hard surfaces complicate the run-off of excessive stormwater and absorb heat rather than reflect it (Gill et al. 2007, Lindley et al. 2006). Uncertainty related to the magnitude and rate as well as the persistence and irreversibility of climatic changes results in diverging values about the impact of the risks. In addition, not all impacts of climate change-related risks are necessarily perceived as a negative impact. For example, for The Netherlands, Runhaar et al. (2012) show that the impact of an increase in temperature is not necessarily considered by urban planners to affect urban systems and services negatively (e.g. higher temperatures could lead to an increase in tourism which is considered beneficial), whereas the expected increase in extreme precipitation events is considered to lead to overall negative impacts.

The third element is the 'moral evaluation' (morality) of the topic. In the case of climate adaptation, we have identified that the moral elements relate to the allocation of responsibilities and the time frame for action. Firstly, there are different values about how the distribution of responsibilities should be arranged institutionally. The questions of whether to address climate adaptation as a stand-alone issue or to mainstream the issue into existing policy domains have been discussed, for example by Uittenbroek et al. (2013), Alber and Kern (2008) and Smit and Wandel (2006). Besides this, the allocation between public and private actors is also a point of discussion (Mees et al. 2013, Reid and Toffel 2009). Secondly, values that also concern morality relate to the time frame for

action. Climate change is often overshadowed by other societal issues as it is considered a long-term problem and thus placed on the mid-term or long-term agenda. Yet, other researchers argue that climate change requires short-term efforts and investments (e.g. Tompkins et al. 2010). The urgency for investing in the short term is supported by the idea that the current costs of required solutions are lower than future costs of possible damages (Runhaar et al. 2012).

The final element of treatment recommendation (solutions) gives rise to a variety of values, as the uncertainty about the risks, rate and magnitude of impacts complicates the search for and implementation of effective solutions. The effectiveness of a solution is measured with respect to the projected outcome, which for some is a fully climate-proof system in which the vulnerability to climate risks is reduced to zero (Schipper 2007), whereas others believe that this is an unrealistic goal (e.g. Kabat et al. 2005). They propose solutions that are more flexible, resilient (see Dessai and Hulme 2004) or non-regrettable (see Hallegate 2009). The feasibility of the solutions also varies according to the spatial scale; for example, green roofs are feasible where buildings are concerned, but water storage might be more effective at the scale of the neighborhood (cf. Runhaar et al. 2012).

3.3 Q METHODOLOGY

3.3.1 The value of Q methodology

To gain insight into the organizational values concerning climate adaptation within municipalities, we have developed a research protocol based on Q methodology. This methodology provides a way to identify values and to systematically reveal patterns in these values by applying factor analysis (McKeown and Thomas 1988, Stephenson 1953). In this methodology, respondents are asked to sort statements according to a ranking, for example to what extent they agree or disagree with the statement. For this a fixed distribution is used which allows to evaluate and compare the statements in a qualitative way. The method is useful for uncovering value patterns related to open discourses – this means that the topic at hand is open to various interpretations, difficult to comprehend and ambiguous (Dryzek and Berejikian 1993). Therefore, the method has been applied to environmental policy issues such as waste management (Wolsink 2004), wind energy (Wolsink and Breukers 2010) and flood management (Raadgever et al. 2008).

So far, only limited research has been conducted with regard to the application of the Q method to climate change. Niemeyer et al. (2005) applied the Q method to map the responses of the UK public to several climate scenarios. Instead of using statements, Lorenzoni et al. (2007) and also O'Neill and Nicholson-Cole (2009) used climate change imagery to measure people's perception of climate risks based on salience and urgency to engage. The focus in these studies was

on the individual values in society. But the method can also be applied to reveal value patterns within organizations – e.g. to gain insight into the variety of values concerning climate adaptation within a municipality. In that case, the respondents arrange the statements based on the knowledge and values that are socially shared within their organization.

Two advantages of Q methodology are that the value patterns for the analysis are produced by the respondents and not the analyzing researcher and that it can be applied to a small, selected sample of individuals. The value of Q analysis is that it identifies shared values between respondents, and concurrently, reveals the differences in the respondents' values. The objective of a Q method is not to develop statistically generalizable results but as Steelman and Maguire (1999 p.363) state, to provide 'an in-depth portrait of typologies of perspectives that prevail in a given situation'. In this research, we want to understand the differences in the willingness to act upon climate adaptation and in particular how policy domains perceive their role in climate adaptation.

3.3.2 Applying Q methodology

Q method follows a structured number of steps, which include (1) the selection of relevant statements (Q set), (2) the selection of respondents (P set), (3) the sorting of the statements by the respondents (Q sort), (4) factor analysis and (5) the labeling and interpretation of the factor analysis outcome (cf. Webler et al. 2009).

(1) For the Q set, an initial list of 180 statements related to the topic of climate adaptation was collected from policy documents, scientific papers and newspaper articles. From this list, 48 statements were selected using a selection matrix including the four elements discussed in Section 3.2 (see table 3.2) (cf. McKeown and Thomas 1988). The selection matrix provides a structural way for obtaining a representative set of statements. All possible combinations are represented at least three times in the Q set in order to test the consistency of statement placements by the respondent. Preliminary Q sets, which were in Dutch, were tested on ten colleagues of the authors in order to verify consistency and completeness (cf. Raadgever et al. 2008).

(2) As the aim of the chapter is to gain insight into the organizational values of various policy departments, we asked the three municipalities to appoint at least one respondent per policy department related to the policy domains: spatial planning, urban design, water, environment, climate/sustainability, infrastructure, project management and public health. The selection of the departments is based on the expectation that these policy domains are most likely affected by climate risks (Satterthwaite 2008b). Additional selection criteria for the respondents were that they worked for at least a year at the department (so that the respondent had an understanding of the knowledge and

Table 3.2 | Selection matrix for Q set

Main effects	Components				N
Direction	(a) adaptation	(b) no adaptation			2
Dimensions	(c) awareness	(d) urgency			2
Elements	(e) problem	(f) impacts			4
	(g) morality	(h) solutions			
	ace	ade	bce	bde	
	acf	adf	bcf	bdf	
	acg	adg	bcg	bdg	
	ach	adh	bch	bdh	
Q sample = ([direction][dimensions][elements])(replications) = ([2][2][4])(3) = 48 statements					

values present in the department) and participated in current policy debates and processes. This resulted in a P set of 27 interviewees (table 3.3) who were invited to do a Q sort, supplemented by a semi-structured interview between June and August 2012 (also see Appendix C).

(3) For the Q sort, the respondents assigned each statement to one of the 48 boxes according to an 11-scale ranking in a fixed distribution from most agree (score 5) to most disagree (score -5) (see figure 3.1). Due to the fixed distribution, the respondents are allowed to only assign a limited number of statements to a score – e.g. only two statements were allowed on the extremes (+5/ -5), while eight statements were to score neutral (i.e. 0). The aim of the fixed distribution is to force respondents to judge the statements relative to those on the extremes. This provides more subtle understandings of the organizational values of each department.

In order to identify the organizational values and not the individual values, the respondents were explicitly given the assignment to arrange the statements based on the knowledge and values that they considered to be socially shared within the department, even if these differed from their own personal values. In addition, during and after the sorting, the respondents were asked control questions such as whether or not they thought that everyone in the department

Table 3.3 | Number of respondents of the departments in the municipalities

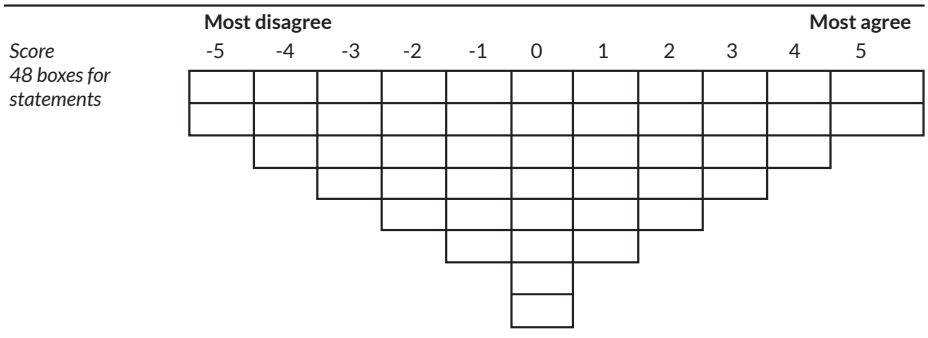
Departments	Municipality		
	Amsterdam	*The Hague*	*Rotterdam*
Spatial Planning	1	1	2
Urban Design	1		1
Water	2	1	1
Environment	1	1	1
Infrastructure	2	1	1
Urban Development	1	1	1
Climate / Sustainability	1	1	1
Public Health	2	1	1
Total (N=27)	11	7	9

shared the same knowledge on climate adaptation, to what extent the organizational values differed from their individual values and whether they considered their knowledge of climate adaptation to be more developed compared to that of their colleagues in the same department (which several respondents acknowledged). Since generally only one respondent was asked to do a Q sort on the organizational values, we consider the sorts to be indicative and not representative. After sorting the statements, the respondents were to respond on the placement of certain statements.

(4) For the factor analysis, the software program PQmethod is used, which runs a principal component analysis (PCA) and allows for rotation of the factors (Schmolck 2002). PCA is based on the correlations between the scores of statements as recorded in the Q sorts completed by the respondents. By calculating correlation coefficients between Q sorts, the principal component analysis identifies shared organizational values among the policy departments. The results of a PCA are a number of factors that each represents a group of respondents with similar viewpoints in relation to the statements included in this study. In this chapter, a factor is also referred to as a (organizational) value pattern. After retrieving them, the factors were rotated manually. Rotation is a part of the factor analysis and is necessary to create the factor solution (Webler et al. 2009). Manual rotation allows the factors to be rotated based on theoretical reasoning or notions (cf. Brown 1993) to highlight connections between respondents that are not visible in case of the raw data or varimax rotation (i.e. the maximization of the sum of variances). To be clear, neither the coherence of the individual Q sorts nor the relationships between the Q sorts are affected by manual rotation (Wolsink and Breukers 2010).

Our manual rotation is based on the notion that in spite of the overall relevance given to climate adaptation by all respondents, there were subtle differences in how this relevance was expressed. While in the raw data the respondents associated mostly with two factors, a third factor was revealed by manual rotation. This shows that there are more subtle differences in values to be noticed (see paragraphs 3.4.3 and 3.4.4).

Figure 3.1 | Fixed distribution for the statements and the scores



(5) Finally, the factors were labeled and interpreted. The labeling and interpretation is based on the distinguishing statements of a factor. These statements are unique to a factor as they have a score that is significantly different from the scores of the other two factors (e.g. see in table 3.4, statement 18 is distinguishing for factor 1). The distinguishing statements enable to differentiate between core and secondary values (Webler et al. 2009). Core values are defined by a score of (-)4 or (-)5 and secondary values have a score of (-)3. The scores for each statement and per factor are listed in table 3.4. In this table, the statements are arranged from consensus to disagreement. Section 3.4 presents interpretations of the three value patterns, which we labeled: (1) start today, (2) not for us to lead, and (3) shared responsibility; and explains which departments 'define' this factor (see table 3.5). A department defines a factor when the factor loading is above 0.5 (plus or minus) (Brown 1993).

In the next section, the value patterns are introduced and compared with each other in order to indicate the similarities and differences between the value patterns. Some quotes from the interviews were used to illustrate the rationale behind some of the values. The interviews were held concurrently with the Q sort; after the respondents sorted the statements, they were asked to elaborate on their choices. This material has been used to support the interpretation of the value patterns.

3.4 THREE DIFFERENT ORGANIZATIONAL VALUE PATTERNS

3.4.1 Factor 1: Start today

This value pattern, which we named 'start today', is characterized by a clear sense of urgency and is defined by all types of departments (see table 3.5). The core value in this value pattern is that climate adaptation is a current issue and not a hype [26][11] that requires a new way of thinking [18]. The value pattern highlights the importance of making the city climate-proof [36] and it rejects values that tend to nuance or minimize the urgency for climate adaptation [8, 11, 27, 33]. The urgency for action is additionally expressed by the support for the value that uncertainty about risks and impacts should not be considered an excuse for inaction [36]. According to a respondent: "Knowledge needs to be developed further. There is still much to discover and things that need to become more concrete, but the lack of knowledge does not discharge one from acting on the knowledge that we do have" (Interview E/A[12]). The reason that action should take place now is also explained by the secondary value that by investing in adaptation measures today, higher costs in the long term can be

[11] The numbers between brackets refer to the statements.

[12] The first letter indicates the department (C for Climate/Sustainability, E for Environment, I for Infrastructure, PM for Project Management, PH for Public Health, SP for Spatial Planning, UD for Urban Design, W for Water) and the second letter indicates the municipality (A for Amsterdam, R for Rotterdam, H for The Hague).

avoided [21]. In the case of the distribution of responsibilities, the value pattern includes only secondary values in which everybody developing the city is considered to be responsible for climate adaptation [3] and that the issue should be part of the knowledge agenda of the municipality [1]: herewith acknowledging at least a role for the municipality.

3.4.2 Factor 2: Not for us to lead

The second value pattern, which we labeled 'not for us to lead', takes a more extreme position on the responsibilities of a department towards climate adaptation, but in a negative way, by stating that climate adaptation is not considered a responsibility. A noteworthy aspect is that none of the departments responsible for water, spatial planning or public health in the three cities share this value pattern. This value pattern in particular is defined by departments affiliated with the municipality of Amsterdam. The core values include: that the departments (which define this value pattern) are not primarily responsible for climate adaptation [4, 19], nor do they have the budget to invest in climate adaptation measures [28]. Additionally, climate adaptation is not listed high on the political agenda (a secondary value) [25]. This value pattern does not imply that the departments consider climate adaptation as a non-issue, but find that it should not be considered as a stand-alone issue [37]. Furthermore, they think that it should be mainstreamed into relevant domains of policymaking [12]. As one of the respondents argued: "Adaptation needs to be given a platform. In Amsterdam, mitigation is linked to a strategy that includes the wallet of the citizen; saving their money and saving energy. That is convincing" (Interview C/A).

Table 3.4 | Statements scores per factor

		Scores per factor		
	*Statements (random numbers)**	1	2	3
38	Combining housing, water and green infrastructure creates more value.	2	3	3
45	When planning new infrastructure, the vulnerability of the location to extreme weather circumstances should be taken into account.	4	4	5
40	Adding green and water in public space foremost in areas that have much hardened surface, increases the spatial quality of the area.	4	4	4
44	The only policy that needs to be adjusted within the municipality is that of water management.	-4	-4	-5
24	When intensifying the city, this means that space should be reserved for extra water storage that will be needed due to the increase of hardened surface.	3	3	4
41	The consequences of extreme rainfall pose a bigger threat to the city than the consequences of heat.	3	2	1
1	Climate change belongs to the knowledge agenda of the municipality.	3	2	2
16	Citizens need to become aware of the idea that water nuisance can increase due to climate change.	1	1	2

5	What happens in the future should be dealt with in the future.	-5	-4	-5
30	Anticipating climate change creates market opportunities.	1	0	1
9	This city has to anticipate climate change.	5	3	5
31	Mostly private actors profit from adaptation measures, so they should invest in them.	-2	0	-1
34	A few flooded basements does not directly mean that the climate is changing.	0	1	0
36	As long as there is uncertainty about the risks and effects of climate change, there is no reason for taking action.	-4	-3	-3
33	Climate change is not happening at such a fast pace - we have time.	-3	-1	-2
21	By investing in climate adaptation measures today we can circumvent higher costs (e.g. related to future water damage to buildings) in the long term.	3	1	2
2	Water on the street is acceptable as long as it does not evolve into dangerous situations.	0	-1	0
14	Possible health issues caused by climate change need to be communicated by the Public Health department to the citizens.	1	0	3
20	Anticipating climate change is in the interest of my department.	1	2	0
32	The climate is changing and when it becomes a threat my department will deal with it.	-2	-1	-3
25	Climate adaptation is an important issue on the political agenda.	-1	-3	-1
39	Everybody understands the relevance of climate adaptation, but other interests often get priority.	1	-1	1
7	The municipality is aware of climate change, but it does not have enough knowledge to act adequately.	0	-2	-1
27	The safety of citizens is only at stake if the water rises above our knees.	-4	-2	-4
26	Climate adaptation is a hype; it will blow over.	-4	-3	-2
11	Damages and human suffering due to climate change (such as floods) are exaggerated; it is not that bad.	-3	-1	-1
13	The municipality should give basic information to citizens on the expected risks and dangers related to climate change for the city.	1	1	3
22	Today's urban design is inadequate and innovative measures are necessary; e.g. green roofs or water squares.	2	0	2
48	Climate change only has adverse effects.	-2	-2	-4
29	Further intensification of the city is necessary to achieve growth.	0	3	0
17	Climate adaptation is necessary to avoid irreversible damages.	2	0	1
47	Innovative adaptation measures, such as green roofs and permeable surfaces, lead to higher maintenance costs.	-1	2	-1
3	Climate adaptation is a responsibility of everyone who works on the development of the city.	3	0	4

46	The municipality should provide subsidies to stimulate the implementation of adaptation measures.	0	-2	1
37	Climate adaptation should be a goal in itself.	-1	-4	-3
8	Climate adaptation is necessary, but there is no hurry.	-3	0	0
23	Climate adaptation should be included as a goal in every policy process.	2	-1	-1
6	Individuals should provide for their own water storage.	-3	-2	0
12	It is better to mainstream climate to relevant sectors than create a separate department.	2	5	3
43	The municipality needs to follow the example of Toronto and Stuttgart, where buildings with a large roof are obliged to have a green roof.	0	-3	-2
10	It is clear that climate change results in certain risks, but it is unclear to what rate and what the precise consequences are.	-1	2	2
19	My department should be mainly responsible for climate proofing public space.	-2	-5	-2
18	Climate adaptation requires a difference in thinking and acting.	5	0	1
28	My department has a budget for climate adaptation measures.	-1	-5	-2
42	Reducing CO2 emissions is more important than adjusting the urban design because of climate risks.	-2	1	-3
4	My department has more important tasks than anticipating climate change.	0	4	0
15	A climate-proof city circumvents nuisance that is created by extreme weather circumstances such as heavy precipitation.	4	5	0
35	Climate adaptation is not important within my department.	-1	1	-4

* The statements are arranged from consensus to disagreement. This means that among the factors, the placement (or average score) of the statements is most similar at the top and most different at the bottom of the table.

3.4.3 Factor 3: Shared responsibility

The third value pattern, which we entitled 'shared responsibility', shares several values with the first value pattern, but distinguishes itself from 'start today' mainly on the issue of communication with citizens and sharing responsibilities. The value pattern is defined by departments from all municipalities, but is most consistently present in the departments of the municipality of The Hague. In this value pattern, climate adaptation is a responsibility of everybody involved in urban development [3]. The municipality has the role of communicating information on climate adaptation to the citizens [13,14] and of sharing the responsibility for climate adaptation with them; "it is important to provide basic information so that citizens have a starting point and can decide to do something" (Interview W/R). The core value of this pattern is that climate adaptation is considered important within the department [35]. Secondary values show that climate adaptation needs to be integrated in relevant policy domains [12] and it should not be a goal in itself [37].

This value pattern also shows a strong aversion to water management being the only department mainstreaming climate adaptation [44]. As one of the respondents stated: "the municipality is legally responsible for the storage and discharge of stormwater. We [the water department] are responsible for the pipes but not necessarily for the collection of all stormwater" (Interview W2/A). Another respondent added: "if you give the responsibility [for adaptation] to one department, the other departments may automatically think it is taken care of. (...) [climate adaptation] requires more teamwork" (Interview W/H). It is notable that this value pattern is overall defined by the departments of public health and water. These departments are already to some extent addressing the issues related to climate adaptation because among others things they have legal responsibilities. For example, in The Netherlands, the water

Table 3.5 | Factor loadings of departments per municipality*

ROTTERDAM	*Factor 1*	*Factor 2*	*Factor 3*
Urban Design	0.59	0.19	0.48
Spatial planning (1)	0.60	0.08	0.59
Climate / Sustainability	0.59	0.06	0.53
Environment	0.67	0.46	0.36
Project management	0.70	0.12	0.24
Infrastructure	-0.05	0.64	0.53
Public Health	0.33	0.32	0.57
Water	0.52	0.37	0.58
Spatial planning (2)	0.30	0.16	0.71

AMSTERDAM	*Factor 1*	*Factor 2*	*Factor 3*
Infrastructure (1)	0.72	0.18	0.31
Public Health (1)	0.66	0.29	0.49
Public Health (2)	0.60	0.09	0.58
Environment	0.58	0.26	0.48
Water (1)	0.61	0.24	0.52
Spatial Planning	0.78	0.13	0.32
Urban Design	-0.06	0.64	0.44
Project management	0.16	0.51	0.44
Climate / Sustainability	0.44	0.72	0.11
Infrastructure (2)	0.51	0.52	0.33
Water (2)	0.04	-0.05	0.83

DEN HAAG	*Factor 1*	*Factor 2*	*Factor 3*
Project management	0.72	0.27	0.34
Environment	0.30	0.83	0.18
Spatial Planning	0.48	0.31	0.60
Public Health	0.45	0.31	0.60
Climate/Sustainability	0.57	0.22	0.62
Water	-0.07	0.29	0.62
Infrastructure	0.34	0.31	0.51

*A department defines a factor when the factor loading is above (+/-) 0.5. The defining factor loadings are highlighted in the table.

department has a legal responsibility in the storage and discharge of stormwater. Therefore, they might have a more temperate view on taking action. Nevertheless, the emphasis in this value pattern is on finding allies and sharing responsibilities.

3.4.4 Similarities and differences between the three value patterns

All value patterns indicate support for and willingness to act on climate adaptation, but to different extents. This is an interesting finding in itself as it could be expected, based on literature, that an important barrier to mainstreaming climate adaptation in existing policy domains is a willingness to act (e.g. Runhaar et al. 2012). Furthermore, there is a general agreement that each city should anticipate climate change as a common concern of the present generation and not the next [5, 9]. Additionally, the consensus on statements [24], [40] and [45] indicates that an understanding for a more specific relation between the possible impacts of climate change, location and solutions in urban design can be found throughout all three value patterns. There is common ground on the elements of problem, impacts and solutions.

The main differences between the three value patterns can be found in organizational values that relate to the moral element. The value patterns differ especially in the time frame for action and the allocation of responsibilities. The first value pattern reveals a more urgent position towards climate adaptation by strongly rejecting values that minimize or nuance climate change [8, 11, 21, 26, 27, 33, 36]. The other two value patterns take a more neutral stance on the time frame for action and illustrate more precisely the relevance of the issue within a department [4, 28, 35] or the role of the municipality [13, 14].

It is noteworthy that none of the value patterns take a strong position on the responsibilities of private actors [6, 31] or on the use of governance tools such as financial incentives [46] or legal obligations [43]. To some extent, this could be due to the way the research was carried out (e.g. the formulation of the statements or the number of statements in which the respondents had to make a selection). But inquiry after the Q sort showed that climate adaptation is not considered purely an exclusive task of private actors. Dutch municipalities are primarily responsible for the maintenance of public space and should be steering the development (Interviews C/H, UD/R). As pointed out by several respondents, in some cases, a centralized approach is considered more effective, for example in case of water storage (Interviews SP1/R, I/R, E/H). Furthermore, several respondents did not consider financial incentives and legal obligations to be the best options for adapting to climate change. Legal obligations were thought by most respondents to "work aversively" or as "a barrier" (Interviews E/R, SP/A) and not preferred by the department or in the municipality (Interviews SP/A, E/R). In the case of financial incentives, respondents argued that "the municipality is not a cash machine" (Interview I/R) and that "people do not learn anything with incentives" (Interviews W/H, PM/R). Yet

other respondents argued that "incentives can help in getting things started" (Interviews I/R, UD/H). It appeared that although the values on appropriate governance tools differed, there was a general consensus on the role of the municipality towards climate change.

3.5 EXPLAINING THE ORGANIZATIONAL VALUE PATTERNS

While Q methodology was applied to reveal patterns in organizational values among the policy departments, interviews and focus groups were used to explain the value patterns in each municipality and to explore the implication of such value patterns for mainstreaming climate adaptation. During the interviews held concurrently with the Q sort, the respondents were asked to elaborate on their distribution of statements as well as to describe the tasks and responsibilities of their policy department with regard to climate adaptation. This gave a first impression of how climate adaptation was addressed in the organizational structure of a particular municipality.

Subsequently, for each city, a focus group was organized including all respondents of the municipality. In a focus group setting the three value patterns were presented. The respondents were first allowed to give their feedback about the value patterns without knowing which value pattern had been defined by them for their department. Accordingly, table 3.5 was shown to them and they were asked again to respond, as well as to give possible explanations for the dominant value patterns in their municipality.

Although all three value patterns are present within departments in each municipality, different value patterns prevail in each municipality (see table 3.5). In Amsterdam, the 'start today' and 'not for us to lead' are most prominent, while The Hague relates more to the value pattern of 'shared responsibility' and in Rotterdam, the first and third value patterns are largely present. It must be pointed out that in the case of Amsterdam, several respondents who relate to factor 1, also show significant factor loadings on factor 3. Nonetheless, this analysis shows that there are different organizational values on climate adaptation within and between municipalities. Now we will explain why these value patterns are prominent in each municipality.

3.5.1 Amsterdam

A contradiction in value patterns can be observed in Amsterdam. One value pattern outlines a call for action for climate adaptation because it requires a new way of thinking, while the other indicates that climate adaptation does not have priority in the policy department (that defines this value pattern). The fact that four departments of the municipality of Amsterdam define the value pattern of 'not for us to lead' can be explained by taking into consideration the political

agenda of the current alderman[13] who holds the portfolios of spatial planning and development; and climate and energy. The alderman has chosen to focus on climate mitigation (reducing CO2 emissions and energy costs) and to disregard climate adaptation. Hence, officially, the organizational structure does not address climate adaptation. According to one of the respondents: "It is not that I think it is not our task, it is just that I can only spend 2 percent of my time on it" (Focus group Amsterdam). The departments related to the first value pattern – water, spatial planning, public health and environment – do address climate adaptation by investing in, for example, heat maps and research programs, despite the focus of the alderman on mitigation and an unsupportive organizational structure for climate adaptation (see e.g. interviews SP/A and W1/A). As a respondent said "aldermen can be curious, but you have to present them with the information first. The departments should develop this knowledge" (Interview W1/A).

3.5.2 Rotterdam

The prevailing value patterns in Rotterdam mostly differ in the secondary values rather than the core values. Some departments – especially related to spatial development – put more focus on activating investments in adaptation measures and urban design, while other departments such as water and public health consider the communication with citizens more relevant. But in general, climate adaptation is considered a relevant topic by all policy departments. The occurrence of these two value patterns is explained by the fact that at the time of the research, Rotterdam was the only city with a separate adaptation strategy and resources for adaptation measures. During the interviews, the departments pointed out that the alderman was persuaded to provide a budget for adaptation "a couple of years ago. (…) At that time we presented climate adaptation and smart water management as an opportunity" (Interview C/R). By framing it in such a way, the municipality obtained an organizational structure that allocated tasks and resources specifically towards climate adaptation. However, during the focus group, respondents questioned whether a new budget would be allocated to this topic today or in the near future, since the focus is currently changing towards other social and economic issues (Focus group Rotterdam). Also, because the department of climate was closed in 2013, the issue and positioning of climate adaptation within the municipality needs to be reconsidered: "climate adaptation should then be part of the existing policy departments. But a small group of people is needed to drive this" (Focus group Rotterdam).

[13] In The Netherlands, an alderman is a city government official who is elected by the city council. Each alderman has his own portfolio which includes one or more municipal policy domains. An alderman holds the mandate to govern the municipal departments that affiliate with his or her portfolio.

3.5.3 The Hague

Policy departments in The Hague appeared to be most similar in their organizational values on climate adaptation: five out of the seven departments defined the 'shared responsibility' value pattern. From the interviews, it became clear that within the municipality, climate adaptation was considered a task of the urban development department, which encompasses the departments of spatial planning, climate/sustainability, infrastructure and project management – all related to the third value pattern. The environment and water departments are part of the city maintenance department, which is responsible for mitigation. This also explained the position of department of environment with the second value pattern. However, the respondent of the water department stated that water and climate are implicitly related, and disapproved of the allocation of adaptation tasks solely to the departments of urban development (Interview W/H). As mentioned earlier, the third value pattern illustrates a more temperate view on taking climate adaptation actions. During the focus group, various departments endorsed the nuances, and if they did address it they preferred to use terms other than climate adaptation, so that the aldermen and citizens would understand better (Focus group The Hague). According to a respondent: "We have already done much in the city [which links to adaptation]. (…) It is just that in the last couple of years this has been referred to as climate adaptation. (…) The term is not really understood by the aldermen. However, when you talk about water nuisance or sea level rise, you will catch their attention immediately" (Interview C/H).

3.5.4 Exploring possible implications of the value patterns for mainstreaming

Our findings show that none of the departments opposed actions in favor of climate adaptation, which means that in all value patterns there is to some extent a willingness to act. This poses an opportunity for the mainstreaming of climate adaptation in local policies and actions. However, the findings also show two kinds of barriers, organizational and political, that complicate mainstreaming. First, several departments pointed out that there is an unsupportive organizational structure for climate adaptation, as their department was not given the task to address and/or the resources for climate adaptation. This limits the actions that a department can take and is often a result of a lack of political commitment and leadership: the second barrier. The attention of politicians to climate adaptation or the lack thereof has been previously discussed by several researchers and is considered a substantial political barrier to the implementation of climate adaptation (e.g. Biesbroek et al. 2009b, McCarney et al. 2011).

All together, these findings indicate a friction between the policy departments and their aldermen. The departments believe that climate adaptation is an important topic for the municipality to address, but aldermen are prioritizing other topics on the political agenda, which limits the action of policy departments towards climate adaptation. This makes the willingness to act (or the

organizational values on climate adaptation) of policy departments even more significant, especially as one realizes that policy departments have the ability to bring important topics to an alderman's attention (Kingdon 2002). This indicates that policy departments can also take leadership by showing institutional entrepreneurship (Wejs et al. 2013). For climate adaptation, it is essential that policy departments invest in knowledge development and create a frame that convinces the aldermen of the importance of the topic at hand. The findings revealed that in order to signify the relevance of climate adaptation, many policy departments use concepts and terms closely related to the current framings in their own policy domain. Through strategic framing, several policy departments are in a sense already mainstreaming climate adaptation.

3.6 CONCLUSIONS

The aims of this chapter were to identify and explain patterns in organizational values concerning climate adaptation within three Dutch municipalities – The Hague, Amsterdam and Rotterdam - and to explore the possible implications for mainstreaming climate adaptation. Various researchers have argued that climate adaptation should be ideally mainstreamed in existing policy domains. But since mainstreaming is not evident, as not all policy domains are legally obligated to do so, we anticipated that actual mainstreaming of climate adaptation is dependent on the willingness of actors in various policy domains to act upon climate adaptation. Therefore, we were interested in how policy departments at the local level value the risks, urgency and responsibilities of climate adaptation.

Q methodology revealed three value patterns – (1) start today, (2) not for us to lead and (3) shared responsibility – that indicate differences in the timeframe of action with respect to climate adaptation and the allocation of responsibilities for implementation. Both issues have been broadly discussed elsewhere (e.g. Mees et al. 2013). Our findings indicate two opportunities for mainstreaming: first, that there is to some extent willingness to act upon climate adaptation, and second, by framing strategically, synergies can be found between climate adaptation and existing policy objectives and acceptance to mainstream climate adaptation can be gained. However, two barriers to mainstreaming climate adaptation were also perceived during the interviews and focus groups: an unsupportive organizational structure and a lack of political commitment and leadership.

The research illustrates how organizational values can differ between and within one organization and how they influence the mainstreaming of climate adaptation objectives in existing policy domains (such as water management and public health). We expect this finding is not unique to The Netherlands, as values concerning key tasks and responsibilities within policy domains that are expected to mainstream adaptation objectives are also found to impede climate

adaptation action in other countries such as Denmark and Norway (see Wejs et al. 2013). Differences in organizational values need to be identified and understood in order to enhance policymaking and mainstreaming of climate adaptation in different policy domains. Moreover, the barriers to climate change adaptation identified in this study – lack of political commitment, undefined allocation of responsibilities and limited resources – are also observed in other countries (e.g. Bulkeley 2009).

More specifically, our study points out that the lack of political commitment for climate adaptation does not always correspond with the organizational values of a policy department and that policy departments are searching for strategies to obtain political commitment to the topic. The strategy of framing will be applicable in each policy domain. We encourage further research into what other concepts and terms for climate adaptation are applied in different policy domains, as this will provide insights into how to facilitate political and financial support for the mainstreaming of climate adaptation.

CHAPTER 4 | Political commitment in organizing municipal responses to climate adaptation: the dedicated approach versus the mainstreaming approach

Abstract | *The aim of this chapter is to develop conceptual understanding of political commitment in two approaches to organizing municipal responses to climate adaptation. The dedicated approach, based on direct political commitment to climate adaptation, implies political agenda-setting, resource allocation, and clear policy objectives which are expected to facilitate rapid implementation due to political pressure and new structures. The mainstreaming approach is based on indirect political commitment; climate adaptation 'piggybacks' on the established commitment of policy domains in which it is integrated, and institutional entrepreneurs and framing are considered necessary to establish policy synergies and to mobilize actors and resources. An implication is that implementation may be erratic, as entrepreneurs have to pioneer within existing structures. The cases of two Dutch cities – Amsterdam and Rotterdam – help to illustrate and refine our propositions on the nature and implications of political commitment. We conclude by discussing how the two approaches could benefit from each other.*

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4.1 INTRODUCTION

Climate change poses challenges for cities. Increases in temperature and excessive precipitation events are expected to intensify climate risks such as heat stress, droughts and urban flooding (IPCC 2007), which will put additional stress on the built environment and urban services and systems, such as possible economic damage, social disruption and health problems. Cities need to prepare for and focus on adapting to these expected climate risks (Hunt and Watkiss 2011, Carmin et al. 2009). Although the number of cities adapting to climate change is increasing (Bulkeley and Betsill 2013), many barriers are still perceived by policymakers during the initiation and implementation of municipal responses to climate adaptation. These barriers concern uncertainties about the risks and impacts of climate change, financial constraints, lack of local expertise and undefined role for local governments. Moreover, an often observed barrier is lack of political commitment (Bulkeley and Betsill 2013, Runhaar et al. 2012, Moser and Ekstrom 2010, Amundsen et al. 2010, Sippel and Jenssen 2009).

Political commitment is often defined in terms of the political agenda-setting of climate adaptation, allocated resources and endorsement of specific adaptation policies in order to organising climate adaptation responses such as programs, actor networks or physical measures (McCarney et al. 2011, Smith et al. 2009, Carmin et al. 2009). This definition of direct political commitment to climate adaptation seems to relate to what Uittenbroek et al. (2013) refer to as 'a dedicated approach'. In this approach, climate adaptation is presented as a new policy domain. While this is a direct approach to organizing climate adaptation responses, only some cities have shown the political commitment necessary to apply it (Bulkeley and Betsill 2013). However, the competition of other (short-term) objectives, the uncertainty and long-term character of climate change, the limited carrying capacity of an agenda, and limited resources mean that local politicians cannot always provide such direct commitment to climate adaptation (Biesbroek et al. 2009b, Storbjörk 2007, Kingdon 2002, Hillgartner and Bosk 1988).

An alternative definition of – indirect – political commitment focuses on a more pragmatic approach to organizing municipal responses to climate adaptation: 'the mainstreaming approach' (Uittenbroek et al. 2013, Bulkeley et al. 2009, Kern and Alber, 2008). This approach aims to integrate climate adaptation into existing policy domains such as spatial planning, water management and public health. Here the political agenda-setting and allocation of resources are indirect, and climate adaptation responses are organized through finding synergies by policy coupling and combining resources. Several researchers argue that the mainstreaming of climate adaptation leads to more efficient and effective policymaking (Mickwitz et al. 2009, Kok and De Coninck 2007). Since climate adaptation is integrated into existing policy domains, the political commitment

to the mainstreaming approach might differ from the commitment needed for the dedicated approach. In the mainstreaming approach, political commitment for climate adaptation can be gained indirectly: climate adaptation can 'piggyback' on established political commitment to the existing policy domain in which it is integrated. To establish this indirect political commitment, institutional entrepreneurs need to be present in these policy domains (Wejs et al. 2013, Carmin et al. 2012). These entrepreneurs need to be willing to act upon climate adaptation and frame it in such a way that it links to the objectives of the policy domain. Only then can it become part of the agenda of an existing policy domain, obtain resources and become embedded in the policy of the existing policy domain. A possible implication of the mainstreaming approach is that implementation of climate adaptation responses is erratic because climate adaptation has to be continuously reframed in order to link to the existing policy objectives. However, little has been written about the nature and implications of political commitment to various approaches to governing climate adaptation.

We aim to fill this gap in the literature by improving our conceptual understanding of political commitment in two approaches to organizing climate adaptation responses: the dedicated approach and the mainstreaming approach. These have been frequently discussed in recent adaptation literature (e.g. Uittenbroek et al. 2013, Kern and Alber 2008) and can be identified in practice. We ask how does political commitment vary in the two approaches, and what are the implications for municipal responses to climate adaptation? The added value of our discussion lies in the conceptualization of the nature and implications of political commitment in the case of mainstreaming, which we apply this to the specific field of climate adaptation.

In the next section, we provide an analytical framework for characterizing the two approaches to climate adaptation, and develop propositions about the nature and implications of political commitment to the initiation and implementation of these approaches. Accordingly, two case studies – the Dutch cities of Amsterdam and Rotterdam – are used to illustrate the two approaches and to explore to what extent propositions about the nature of political commitment need to be refined. We conclude by discussing how the two approaches could benefit from each other.

4.2 AN ANALYTICAL FRAMEWORK FOR POLITICAL COMMITMENT

4.2.1 Agenda-setting, framing and resource allocation

Theories of agenda-setting, developed by, for example, Hilgartner and Bosk (1988), Baumgartner and Jones (1993) and Rochefort and Cobb (1994), provide useful insights into the rise and fall of issues on the agenda, but here we build on Kingdon's (2002) multiple streams model. Whereas the other models

provide adequate approaches to conceptualize agenda-setting and the dynamics in agendas, it is this multiple streams model that aims to provide the in-depth explanations which we need to address our research questions. Kingdon explains that the issues on the political agenda can come from three types of streams: problems, policies and politics[14]. These streams work independently from each other and compete for political attention. However, a combination of the three provides a 'policy window': an opening for placing an issue on the political agenda. When selecting issues for the agenda, politicians will avoid taking decisions that could be perceived as unfavorable or could damage them politically (Termeer 2009). They tend to focus on societal issues that are deemed more salient and for which they receive immediate credits (Biesbroek et al. 2009b, Storbjörk 2007). However, governments generally do not just have one agenda. The political agenda includes the issues that politicians find important to be carried out throughout the municipality, but there are more specialized agendas within the municipal government, for example the agenda of a policy department (Kingdon 2002). These specialized agendas contain the issues for a certain policy domain and are more specific about the policies and actions needed within that domain. Here we refer to these agendas of a policy domain as a policy agenda.

Policymakers are expected to execute the issues on the political agenda as well as the policy agenda. Kingdon (2002, p.33) argues that it is important for policymakers within a certain policy department to make sure that their organizational values – i.e. a policy department's socially shared representation of salient issues and strategies – are to some extent addressed on the political agenda in order to set a policy agenda. Policymakers have the ability to focus the attention of politicians by informing and convincing them to commit to certain issues. Moreover, Kingdon argues that policymakers should use this ability to gain the resources needed, because if politicians are committed to an issue, it will probably lead to the provision of additional resources such as a special bureau and/or earmarked budgets. However, if an issue is not part of the political agenda, limited or no (additional) resources are made available to address it. Policymakers then have to move within the existing structures of their organization to initiate climate adaptation responses.

Policymakers (but also politicians and other kinds of actors) can use framing as a tool to gain political commitment. Several researchers have argued that the framing of the issue can have enormous consequences for how an issue is handled in the political process (Pralle 2009, Betsill and Bulkeley 2007). An

[14] The problem stream consists of societal problems advocated by political actors and stakeholders. Whereas a society is continuously affected by events or crises, not all of these are in need of government attention. The policy stream includes the input of the ongoing generation and (re)consideration of policy alternatives by policymakers, researchers and interest groups. The politics stream is related to political forces such as alterations in the national political situation, organized political powers, change of administration and allocation of power, time and resources to the organization (Kingdon 2002).

issue can be framed as a problem or a solution, as a main objective or an added value (Rochefort and Cobb 1993). For example, climate adaptation can be considered as a problem that requires investments or can be framed as an opportunity for sustaining an attractive and safe city. Stressing ethical as well as economic valuations of an issue often helps in shaping the problem definition (Entman 1993, Rochefort and Cobb 1993). If a dedicated approach is applied, climate adaptation is framed as the main objective, as opposed to the mainstreaming approach in which climate adaptation is considered as an added value to another objective. Policymakers (or actors outside the government) who use framing, their ability to focus, and their ability to spot policy windows are referred to by Kingdon (2002) as policy entrepreneurs. Others have adopted the concepts of local champions (e.g. Carmin et al. 2012) or institutional entrepreneurs (e.g. Wejs et al. 2013). These entrepreneurs navigate through existing structures, mobilizing actors and resources in order to create new structures or transform existing ones. Here, we will apply the term 'institutional entrepreneur', whose task is not to obtain only political commitment, but commitment throughout the organization. Many researchers have pointed out that without such entrepreneurs, cities rarely act on climate change (Carmin et al. 2012, Bulkeley 2010, Bassett and Shandas 2010, Betsill and Rabe 2009).

4.2.2 Policy design and delivery

If direct political commitment results in agenda-setting, this would ideally lead to a change in policy (Kingdon 2002). This change occurs through the formulation of policy objectives and solutions, and accordingly, the development of new policies or the integration in existing policies, although it should be recognized that barriers can occur in subsequent stages of the policy process (Moser and Ekstrom 2010). For example, several cities have created specific policy documents that address climate change and adaptation (Bassett and Shandas 2010). According to Carmin et al. (2009 p.431), the development of such specific plans for adaptation is one extreme and 'these efforts are the exception rather than the rule'. This observation is confirmed by Reckien et al. (2014) who found that 72 percent of the 200 European municipalities analyzed had no specific adaptation plan. The integration of climate adaptation in sector-based policies is more common (Carmin et al. 2009, Mickwitz et al. 2009). Climate-sensitive policy domains such as spatial planning, water management, infrastructure, agriculture and public health, determine the risks and solutions for their domain and integrate these in existing policy documents. For these domains, the integration of climate adaptation can be a deliberate and sustainable decision that focuses on the assessment of the need for adaptation in the policy domain (Uittenbroek et al. 2013).

Finally, the policy objectives and solutions mentioned in specific or sector-based policies have to be implemented. Several researchers have listed barriers that can hamper policy implementation (Moser and Ekstrom 2010, Biesbroek et al.

2009b, Wildavsky and Pressman 1973). Political commitment, whether direct or indirect, will also have implications for implementation, for example for the time frame in which policy objectives are met. In planning theory, policy implementation is evaluated based on two criteria: conformance and performance (Faludi 2000, Faludi and Mastop 1997). Conformance implies that the outcome reflects the policy objectives in terms of formalities, behavior and/or material reality (Mastop and Faludi 1997). The delivery of policy objectives is largely undertaken without further consideration, and would facilitate fast and effective implementation (van Doren et al. 2013, Mastop and Faludi 1997). Whether or not that is true is underexplored. For example, if the forecast was inaccurate or the objective in combination with other policy objectives leads to an increase in vulnerability to climate change (i.e. maladaptation), then conformance is not effective in serving the policy objective. Conformance neglects to provide insights into how the policy objective has been assessed in relation to other policy objectives during the decision-making process and to what extent it has influenced the outcome (Uittenbroek et al. 2013). In the case of performance, a policy objective can be perceived, considered and acknowledged, but is not necessarily addressed in conformance with the norm (van Doren et al. 2013). A possible result is that the objective is not included in the outcome at all. However, as long as this exclusion is based on a deliberative assessment, the outcome is not necessarily ineffective (Faludi 2000). The dedicated approach is often conformance-based, while the mainstreaming approach is considered to be performance-based (Uittenbroek et al. 2013). An example may make the distinction between conformance and performance clearer. Suppose a policy objective is to develop underground water storage of 600 m3, but this is physically not possible unless existing infrastructure is diverted; policymakers can decide to create water storage with a smaller capacity or seek solutions above ground such as green stormwater infrastructure (GSI)[15]. Furthermore, other social and environmental benefits of GSI such as improved quality of life and air quality could compensate for the smaller capacity. From a conformance perspective, such an outcome of the decision-making process could be assessed as insufficient, but from a performance perspective it may appear more positive.

4.2.3 Fast versus erratic

Based on the analytical framework, we formulated propositions on the nature of political commitment in the two approaches and the implications for the implementation of municipal responses to climate adaptation. While both approaches are considered to lead to municipal responses, we expect that the political commitment to climate adaptation in each approach is obtained differently and that this will have different implications for municipal responses in the implementation (see table 4.1). We are aware that we present a schematic framework and that in practice the division between the approaches might be

[15]Examples of GSI practices are retention and detention ponds, permeable pavement, water crates, tree trenches and green roofs (US EPA 2014).

more blurred. Additionally, we consider that one approach can lead to the other and vice versa.

In the dedicated approach, we hypothesized that political commitment is directly given to climate adaptation (see figure 4.1). Politicians have placed it on the political agenda, thus making it an issue that needs to be addressed municipality-wide. Politicians will provide new resources to achieve the policy objectives. The implication of this for the dedicated approach is that there is expected to be a fast and effective implementation of municipal responses.

In the mainstreaming approach, our proposition is that institutional entrepreneurs attempt to obtain indirect political commitment for climate adaptation by framing the issue as an added value to existing political objectives (see figure 4.2). In this way, institutional entrepreneurs place climate adaptation on the policy agenda of their policy department, arrange resources within the existing structures and integrate climate adaptation in the domain's policy documents. We expect that as a result of indirect political commitment, implementation of climate adaptation responses is erratic but deliberate. Additionally, we expect that institutional entrepreneurs continuously need to reframe climate adaptation to fit the objectives of a policy domain.

Table 4.1 | Conceptual understanding of political commitment in the two approaches

		The dedicated approach	**The mainstreaming approach**
Political commitment		direct	indirect
Conditions	*agenda*	political agenda	policy agenda
	framing	main objective	added value
	resources	special bureau	institutional entrepreneurs
	policy design	specific policy	policy integration
	implementation	conformance	performance
Implications		fast / effective	erratic / deliberate

Figure 4.1 | Political commitment in the dedicated approach

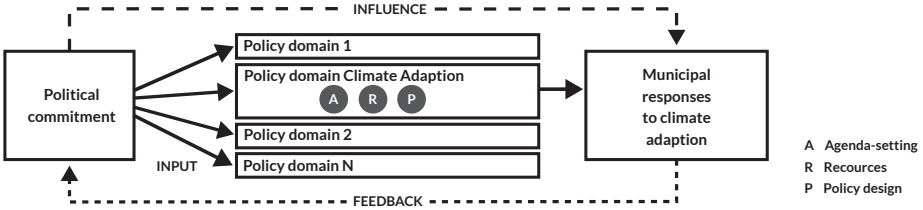
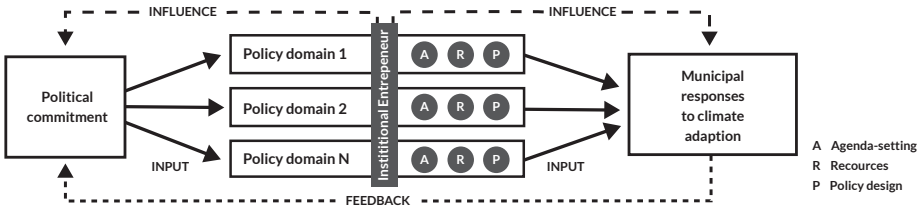


Figure 4.2 | Political commitment in the mainstreaming approach



4.3 TWO APPROACHES, TWO CASE STUDIES

To develop our conceptual understanding of political commitment, we conducted comparative case study research. The strength of the comparative research method is that it can help to develop an understanding of phenomena in different settings (Bryman 2008, Yin 2003); in this case the nature of political commitment in two approaches to organizing climate adaptation responses. Two Dutch cities, Amsterdam and Rotterdam, have been selected for their difference in approach. This is based on earlier observations in which we perceived that the city of Rotterdam generally seems to follow a dedicated approach and the city of Amsterdam a more mainstreaming approach. Both approaches have led to perceivable municipal responses to climate adaptation. These municipal responses vary from established programs and actor networks, policy strategies, policy processes and physical measures. We have selected two cities that have the same national institutional context (The Netherlands). This means that the cities have comparable authority and tasks for engaging in climate adaptation. We also consider the vulnerability to climate risks to be comparable. Although vulnerability differs for each geographical location (Hunt and Watkiss 2011), both cities are considered to be located in a high risk zone when it comes to winter storms, storm surges and flooding (Sundermann et al. 2013, Runhaar et al. 2012).

In both cities, the major documents in the policy domains of spatial planning, climate and water management, as well as the municipal political agendas for 2010-2014, were analyzed. This provided a first insight into the political commitment to climate adaptation and to what extent and how climate adaptation was included in urban policy. The document analysis was complemented by 28 semi-structured interviews with policymakers working in the same policy domains (for more information on the interviewees and policy documents see Appendix D). Most of the interviewees were involved in climate-related responses and were asked to elaborate on how this response was set up, to what extent political commitment was available or needed, and what framing had helped or would help in obtaining climate adaptation. In the Netherlands, policymakers have the ability to present new issues to their politicians – at the

local level this is the municipal board which consists of a mayor and several aldermen. But the authority of whether the issue is placed on the political agenda remains with the municipal board. In the next two sections, we describe the political commitment to climate adaptation in each city in terms of agenda-setting, framing, resource allocation, policymaking and implementation.

Rotterdam – A dedicated approach| In the period 2010-2014, the political agenda includes three main topics: investing in talent, room for entrepreneurship, and an attractive and safe city (Municipality of Rotterdam 2010a). The latter two objectives were to be achieved in a sustainable manner, as proposed in the Rotterdam Climate Initiative (RCI) (Municipality of Rotterdam 2010b). RCI is a citywide climate program[16] installed in 2008 and aimed 'to reduce the CO2 emissions by 50 per cent by 2025 (in relation to 1990); to make the city 100 per cent climate-proof by 2025; and to strengthen the city's economy' (Municipality of Rotterdam 2010b). The second objective – being fully climate-proof – has been addressed in the Rotterdam Climate Proof (RCP) program, which specifically focused on climate adaptation and water management, and aimed to invest in knowledge development and climate solutions that can be applied and exported. As a project leader said: "we really considered if we want to put RCP on the [political] agenda, how to do this? (…) We selected three tracks: we want to implement measures, we need to collect knowledge and we want to profile the city" (Interview R5[17]). This is undertaken for five themes: urban water system, adaptive building, accessibility, flood risk management and urban climate (Municipality of Rotterdam 2010c). Climate adaptation is urgent due to Rotterdam's geographical location (near the sea, in the delta of two rivers), the large areas of hard surfaces and the lack of open water sources (Municipality of Rotterdam 2010c). In order to keep the city safe, livable and accessible, there was a need for smart water management. This was accordingly framed as a strength, to create an economic surplus by profiling Rotterdam as a leading city in the topics of water and climate: "we see climate adaptation as an opportunity. (…) It is a unique selling point: if we can keep our feet dry, being a port city" (interview R6). This framing made politicians want to directly commit to the issue.

As a result of the direct commitment, the issue was put on the agenda in 2010 and new budgets were made available for investments in visible physical adaptation measures (e.g. green roofs), the improvement of its international status as a climate-proof city and the development of an adaptation strategy[18] (Municipality of Rotterdam 2010abc). Although not expected in a dedicated approach, the RCI and associated budgets were placed within existing policy

[16]Rotterdam Climate Initiative is a collaboration between four public and private actors.

[17]All interviews have been given an abbreviation, see appendix D for more information on the interviewee.

[18]RCI has a budget of 30 million euro of which 20 million is to be invested in physical pilot projects (Municipality of Rotterdam 2010b).

domains: those of 'Environment and sustainability' and 'City maintenance' (Municipality of Rotterdam 2010a). The budget and responsibility for implementation of the RCI/RCP was nevertheless assigned to a new special bureau: the climate bureau. This bureau was in existence between 2008 and 2012. Rotterdam Climate Initiative is a collaboration between four public and private actors.Thereafter, it became the Program Bureau of Sustainability, continuing its tasks concerning RCI (Interview R5, R6).

Climate adaptation is included in several policy documents. Most specific is the Rotterdam Adaptation Strategy (RAS), an important output of the Rotterdam Climate Proof program (Municipality of Rotterdam 2013a). The input for the strategy was derived from research projects and experiences with pilot projects (Interview R2). The first conceptual draft entailed an explanation for urgency, ambitions, approaches for different climate risks, and principles that help in selecting and implementing solutions. It is notable of this document that there is a shift in the framing; in the RCP five themes (e.g. urban climate and adaptive building) were followed that connected to policy domains, but these are no longer used in the RAS. According to a project leader of the RAS, "the politicians are not concerned with these themes. Four years ago this division [of themes related to policy domains] seemed practical to organizing integration, and the policy domains would be involved from the beginning. But the aldermen considered that the five themes did not relate to the agendas of the politicians. They consider issues from an economic perspective: a problem, an opportunity. That is what politicians think is important. Hence, we renamed the themes in order to be heard by the politicians" (Interview R2).

In addition to the RAS, the departments of spatial planning and water also addressed climate adaptation in some of their strategic policy documents. For example, in the spatial vision for the area 'Stadshavens', the need for sustainable and climate-proof development, such as the realization of floating houses and offices, is stressed throughout the document (Municipality of Rotterdam 2011). Also, the policy document 'Waterplan 2'[19] (Municipality of Rotterdam 2007, 2013b) produced by the water department, has strong ties (and to some extent overlaps) with the RAS. While the RAS is considered an important document, its positioning in relation to other policy documents is so far somewhat undefined. One project leader said "it is not positioned next to the policies, but rather through the policies, I think". (Interview R2). Another project leader argued that "the RAS is going to be the municipal main guidelines to address climate adaptation. This makes it a bit complex. (…) It mainly enounces an ambition" (Interview R5).

[19]Waterplan 2 is a strategic document that provides insights into the future challenge for the urban water system such as climate change and further urban development.

Besides policies, several pilot projects were realized in Rotterdam, including a floating pavilion[20], water plaza[21], green roofs. Most of these climate adaptation actions were listed as explicit objectives in the RCP and were considered as learning and exposure projects. The aim of implementing a water plaza – an innovative solution for water storage – was already included in the Waterplan 2 (2007a) and the spatial vision for Rotterdam 2030 (2007b). The water plaza was considered a valuable contribution to the image of Rotterdam since it would be the first city with such a plaza (Biesbroek 2013). Funded by specific budgets within the municipality and additional funds from the European Union and Dutch national government (Municipality of Rotterdam 2011), a first attempt to implement a water plaza failed because of a technocratic approach in which neighborhood values were disregarded (Biesbroek 2013, Interview R7 2013). But since the plaza was considered an important output of the RCP, and European funding had been received, the next water plaza needed to succeed. Soon two new locations were developed, picked less because of their vulnerability to flooding or the need for water storage than because they offered the possibility of implementing a water plaza quickly. As a project manager said: "I had one task and that was to realize a water plaza. Anything else was surmountable" (Interview R7). A manager from the maintenance department noticed that there was no clear maintenance plan or budget: 'we all knew that the water plaza was bound to happen; it is a baby of the alderwoman. She wants to score before the end of her term. So she just said: "We will see. If something breaks, we just have to fix it and we shall see where we get the money from". (Interview R9). This illustrates that in a dedicated approach, direct political commitment can speed up the planning process, but that it can also mean that some important decisions (on, e.g., maintenance) are postponed. Additionally, it illustrates that the water plaza was not solely an attempt to address climate adaptation but also a way for the responsible alderwoman to raise her profile. Table 4.2 characterizes the nature of political commitment in the Rotterdam case.

Table 4.2 | Political commitment to climate adaptation in Rotterdam

Agenda-setting	*Political agenda*: Rotterdam Climate Initiative (RCI) as guideline for sustainable development
Framing	*Main objective*: the need for smart water management to keep the city safe, livable and accessible
Resource allocation	*Special bureau*: Program Bureau of Sustainability *Specific budgets:* for pilot projects (e.g., water plaza)
Policy design	*Specific policy:* Rotterdam Adaptation Strategy (RAS)
Implementation	*Conformance:* fast, possible postponement of relevant decisions

[20]The floating pavilion is an expo center floating on water, which serves as an example of adaptive building. In this way, Rotterdam can show new developments in the area of planning, water and climate management (Municipality of Rotterdam 2010c).

[21]The water plaza is an innovative solution for water storage in public space. During a downpour, a water plaza collects and stores the stormwater preventing flooding of neighboring streets. In dry periods, the plaza can be used as a social meeting place or a playground (Municipality of Rotterdam 2010c).

Amsterdam - A mainstreaming approach | Local politicians in Amsterdam did not place climate adaptation on the political agenda in the period 2010-2014. During this period, the three main topics considered salient were: economic growth, social empowerment and sustainable investments (Municipality of Amsterdam 2010a). This does not mean that there was no attention to climate change. Climate mitigation actions, such as the reduction of CO2 and investments in new ways of energy generation – e.g., wind turbines and thermal storage (Municipality of Amsterdam 2010a, 2013a) – were given direct political commitment: new organizational structures (the Program Bureau of Climate and Energy) and allocated budgets, and a specific strategy for climate mitigation (Municipality of Amsterdam 2013a, Interview A3, A20). Climate adaptation was not linked to this strategy. The alderman responsible for the portfolio of Climate, Sustainability and Air Quality argued that "opposed to water management [in relation to climate adaptation], energy transition is a controversial topic that requires political agenda-setting" … (water safety and management are important, but there is no argument there: everybody agrees) (Interview A1). Additionally, there were no signals that the water system of Amsterdam was dysfunctional (Interview A1, A2). This led to the perception that there was no need for additional commitment in terms of political agenda-setting or extra resources.

Amsterdam applies the Compact City approach, which in theory implies favoring mixed use and high densities to reduce mobility (De Roo 2000). "The most important and sustainable choice we have made was choosing for a compact city – building 70,000 new houses without affecting the green infrastructure. (…) Some said our vision does not include climate change: but this vision is all about climate" (Interview A22). Further intensification of the city could make the water system more vulnerable to floods. The City has acknowledged that this could be a potential problem and therefore, the objective of being waterproof – i.e. a highly functional water system that anticipates climate risks such as flooding, water nuisance, drought and rising temperatures (Municipality of Amsterdam 2010b) – has been included in several planning documents approved by politicians responsible for the policy domains of Water, Spatial development, and Climate and Energy.

Politically, climate adaptation was considered an added value (to the compact and sustainable city). Therefore no additional financial or human resources were provided for it during 2010-2014. But local politicians did consider the maintenance and improvement of green infrastructure in and around the city to be relevant. For this, a budget of ten million euros was available, of which some was used as a subsidy for green roofs (Municipality of Amsterdam 2010a, 2013b).

Although climate adaptation is not explicitly part of the political agenda, the issue is addressed in the policy documents of the departments of spatial planning

and water. For example, in the 'Structuurvisie 2040' – the spatial vision for the city to 2040 – the compact city approach is elaborated (Municipality of Amsterdam 2011). Here, the relation between further intensification and more pressure on the water system is acknowledged and translated in a paragraph in which it is advocated that climate change and its possible effects on the water system should be taken into consideration in future urban development (Municipality of Amsterdam 2011). Hence, intensification can only take place in a climate-proof manner with a lot of green spaces and water, or the implementation of alternative ways of water storage (Municipality of Amsterdam 2011).

In addition to the spatial vision for 2040, a group of institutional entrepreneurs within the spatial planning and water department worked together on the policy document 'Amsterdam Waterproof' (Municipality of Amsterdam 2010b). This is also a strategic document, mainly produced because Amsterdam, as a possible case, was ignored in the Deltaprogram[22]: "Amsterdam was not included. So we hooked onto several subprograms, because we were afraid that otherwise we were afraid that there would be solutions that did not fit in our set-up. Hence, we started lobbying to get Amsterdam included" (Interview A4). With Amsterdam Waterproof, the entrepreneurs wanted to state to the politicians of Amsterdam as well as to the national government that although the water system is well-maintained, it needs maintenance. The document describes the history of the Amsterdam water system, how the system has been impacted by urban economic growth, and identifies the challenges to maintain the system with changing circumstances. This document is overall an elaboration on the spatial vision 2040.

In the water department, several other programs have been initiated by institutional entrepreneurs that focus on the problem of addressing excessive stormwater in the streets as a result of an increase in precipitation, for example, the 'Water in the City' and 'WATERgraafsmeer'[23] programs (Municipality of Amsterdam 2013c, 2013d). These advocated a knowledge exchange and/or platform between public and private actors on the topic of avoiding urban flooding. The entrepreneurs set up these programs to stress the need for collaboration between public and private actors in finding alternatives for water storage in the city as well as to establish a network between policy departments within the same municipality. "WATERgraafsmeer was about creating a vital neighborhood by applying robust and unconventional measures [such as GSI]. (…) There was a lot of experimenting, with 35 different actors. (…) and how to make multiple actors take responsibility" (Interview A6). Hence it was

[22] A research program on water management and safety organized by the Dutch national government.

[23] Watergraafsmeer is a neighborhood in Amsterdam. This program was set-up together with City District Amsterdam-East.

not only to apply GSI practices, but also to share the burden of investments in these measures and to create networks in which the traditional allocation of roles is breached.

The policy design in Amsterdam entailed ambitions and intentions, but there were no clear objectives in terms of planned outcomes. Nonetheless, institutional entrepreneurs involved in the WATERgraafsmeer program sought opportunities to set up a pilot project in which climate adaptation measures were integrated in maintenance projects, such as street renewal (Interview A11). A first attempt to implement GSI practices failed due to technical doubts and the fast pace of related developments. A search for other maintenance projects resulted in two more possible pilot project locations. The urban designers from the city district and the managers of the water department were generally willing to implement GSI practices but were limited in their actions because of labelled resources: "we cannot start using our sewage levies for other experimental measures" (Interview A12 – but also A13, A18). Overall, technical complications related to the complexity of cables, sewage and tree roots, in combination with unfamiliarity with the maintenance of these new measures and uncertainties about the allocation of responsibilities for maintenance, made it difficult to find a fitting solution that included GSI practices. Yet, the actors involved in street renewal projects explored the possibility of GSI practices and are aware of possible barriers to their implementation. This can be considered performance. While they have not yet managed to acknowledge the issue in terms of actual implementation, they can continue this exploration and find ways to address the barriers in a next street renewal project. In Amsterdam, as a result of the indirect political commitment, the implementation of climate adaptation responses could therefore be considered performance-based. The nature of political commitment in the Amsterdam case is summarized in table 4.3.

Table 4.3 | Political commitment to climate adaptation in Amsterdam

Agenda-setting	*Policy agenda*: water management/ climate adaptation
Framing	*Added value:* with a compact and sustainable city belongs a well-maintained water system
Resource allocation	*Institutional entrepreneurs:* climate-related responses by individuals within different policy departments *Limited budget*: pilot projects organised based on 'existing' budgets
Policy design	*Policy integration:* climate adaptation integrated in strategic policy documents of spatial planning and water management
Implementation	*Performance*: no planned outcomes, deliberate decision making

4.4 IMPLICATIONS FOR THE TWO APPROACHES

The previous section showed how the nature of political commitment can be different in the dedicated approach and the mainstreaming approach. The findings not only illustrate this difference, but also indicate several implications for each approach.

4.4.1 Dedicated approach

Based on our findings from the Rotterdam case, we identified three implications of direct political commitment for the dedicated approach: political pressure, new structures with one problem owner and positioning.

The direct political commitment in the dedicated approach made it possible to invest in knowledge development and pilot projects, and formulate a strategy that fits the challenges regarding climate adaptation for the city. These were all planned outcomes. It is relevant for the politicians that these planned outcomes are also implemented, because they can be held accountable for whether or not objectives are achieved (Kingdon 2002, Termeer 2009). Hence, they provide pressure to make decisions and investments in order to speed up and/or overcome possible barriers that occur during the implementation process. However, there is the risk that this fast-track decision-making as a result of political pressure might serve the wrong objective. Thus we would argue that available budget and an opportunity to be the first to showcase a certain adaptation response – as with the water plaza in Rotterdam – is not a foundation for sustainable investment. Hence, it is worth considering that a dedicated approach might result in a pursuit of political ambitions instead of sustainable decisions.

A second implication is that new organizational structures are set up that become problem owner as well as budget owner, as with the Program Bureau of Sustainability and adaptation-labelled budgets in Rotterdam. This can result in a clear allocation of responsibilities and fewer complexities regarding coordination and interaction during the implementation phase. Moreover, the additional budgets allow for knowledge development and investments in pilot projects. This provides an opportunity to learn how existing structures and routines need to be altered, based on explorative learning rather than exploitative learning (Sydow et al. 2009). On the other hand, a barrier to climate adaptation might arise if this new structure were not continued in the next political term and no integration or links were established with other policy domains.

This leads to the final implication: positioning. Carmin et al. (2009) observed that where a policy was limited to only general guidelines, policy domains were not using climate adaptation as a point of reference or considering its inclusion in their actions. The Rotterdam case illustrated that the positioning of the

Rotterdam Adaptation Strategy (RAS) was generally unclear as it was unknown to many policymakers if the strategy would be a guideline or would overrule the content of the documents of their policy domains. Furthermore, some policy domains had already started integrating climate adaptation objectives in their own policy documents; in such cases, one could wonder what the added value of a specific adaptation strategy is. This shows that it is important to define clearly what the positioning of adaptation policy is in relation to other existing policies. Otherwise the use of an adaptation strategy could be ineffective.

4.4.2 Mainstreaming approach

The mainstreaming approach as illustrated by the Amsterdam case was based on a more indirect political commitment. Three implications can be observed here: strategic framing, institutional entrepreneurs (and their networking skills) and existing organizational structures.

In the case of the mainstreaming approach, strategic framing has been proven important in order to obtain some form of political commitment to climate adaptation. This has already been argued by many researchers (Pralle 2009, Betsill and Bulkeley 2007) and is again visible in the Amsterdam case. In Amsterdam, investments in a climate-proof water system are possible within the strategic frame of a sustainable and compact city. It is up to the policymakers to develop a strategic frame that allows them enough room to execute their policy agenda (Kingdon 2002).

Another implication is that indirect political commitment appeals to the pioneering and networking skills of the individuals working in different policy domains. These are the earlier mentioned institutional entrepreneurs (Wejs et al. 2013, Bulkeley 2010). These entrepreneurs promote alternative solutions and mobilize networks within and outside the municipality. In Amsterdam, as a result of indirect political commitment, no domain in the municipality considers itself a problem owner. Institutional entrepreneurs can assist by setting up pilot projects to mobilize resources and identify problem owners. Actors mobilized by institutional entrepreneurs deliberately participate in the networks because they want to act on climate adaptation. It is unclear what the impact would be if the institutional entrepreneur would leave its position. Ideally, if the entrepreneur has used its network skills properly actors will perceive, consider and possibly acknowledge the need for climate adaptation, resulting in performance. Yet, it is also possible that actors return to former routines as these are often difficult to change (Sydow et al. 2009).

Finally, the third implication is that of inflexible existing structures and routines. In mainstreaming climate adaptation, the issue is integrated in existing organizational structures and routines. No or limited additional resources are made available to address climate adaptation. Alternative solutions need to be

implemented using existing resources. However, this is difficult because most existing resources are labelled and cannot be used differently – organizational path dependence (Sydow et al. 2009). Hence, it seems that despite the overall willingness of policymakers to act upon climate adaptation, without alterations in the existing structures and routines climate adaptation responses remain limited and inconsistent.

4.5 CONCLUSION

Many researchers in the field of climate adaptation advocate the importance of political commitment (Carmin et al. 2009, McCarney et al. 2011, Biesbroek et al. 2013). Although a growing number of municipalities are taking up the cause of climate adaptation (Bulkeley and Betsill 2013), the political commitment will vary as the authority, resources and networks as well as the impacts of climate risks differ by city and nation (Hunt and Watkiss 2011). We have illustrated how political commitment can vary in two governance approaches to organizing municipal responses – the dedicated approach and the mainstreaming approach – and what the implications are for implementing municipal responses to climate adaptation. This provides a more in-depth insight into how direct or indirect political commitment influences municipal responses to climate adaptation rather than only stating that it is an opportunity or a barrier (Biesbroek et al. 2013).

Our findings suggest that the dedicated approach is based on direct political commitment that provides opportunities, such as political pressure and new organizational structures, but can possibly also experience unclear positioning of policies. Yet, clear positioning of new policies is important as direct political commitment can be discontinued as other social problems enter the political arena (Hillgartner and Bosk 1988, Kingdon 2002, Biesbroek et al. 2009b). The mainstreaming approach depends on indirect political commitment that actors have to establish by strategic framing and networking. Indirect political commitment often leaves organizational structures and routines unchanged, which can hamper municipal responses as actors cannot reallocate their resources to climate adaptation themselves (Kingdon 2002). Thus far, this need for a change in organizational structures and routines has barely been acknowledged in literature. However, existing organizational structures and routines can be rigid and therefore difficult to change (Sydow et al. 2009). It will be relevant to explore how existing structures can be changed where there is only indirect political commitment, as in municipalities that apply the mainstreaming approach.

Further research will be needed to explore political commitment in approaches to governing climate adaptation other than those we labelled as the dedicated and the mainstreaming approaches. This would assist in further refining the need for and nature of political commitment. Applying our conceptual model in cities in other countries would also be valuable for gaining more insight into

contextual factors that might be influential, such as existing experience with climate impacts and national policy. Political commitment to climate adaptation will not be evident in every government. Therefore it will be relevant to research whether there are approaches to governing climate adaptation that function with direct or indirect political commitment.

CHAPTER 5 | Mainstreaming climate adaptation at the implementation level: routines as possible barriers to organizational change

Abstract | *This chapter aims to develop a conceptual framework to better understand the role of organizational routines as possible barriers to the mainstreaming of climate adaptation. Barriers to climate adaptation often emerge at the implementation level. While the mainstreaming of climate adaptation into policy documents is relatively easy, the implementation of these policies seems to be more problematic. The implementation of these policies is often undertaken by other actors in- or outside the municipal organization, who generally act based on organizational routines. Reorganizing the resources and practices of these actors to initiate mainstreaming often proves difficult, as a result of the actors' standardized routines. As organizational routines aim to provide stability, they tend to be reaffirmative. Consequently, they could prevent policy change. An analytical framework consisting of four self-reinforcing mechanisms is used to understand and explain how organizational routines can hamper the mainstreaming of climate adaptation during implementation. A case study is used to illustrate organizational routines as possible barriers. The chapter concludes by stating that a change in routines is needed in order to optimize the possibilities of mainstreaming climate adaptation. In order to stimulate change in organizational routines the focus should be on legitimacy building and learning.*

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5.1 INTRODUCTION

Climate change is considered to be one of the main challenges that cities have to deal with (Bulkeley 2013, Hunt and Watkiss 2011, McCarney et al. 2011). Cities are in general densely built and highly populated which makes them vulnerable to climate change risks. A calculated increase in temperature, more extreme precipitation events and sea level rise are expected to induce risks, such as heat stress, (urban) flooding and periods of drought (OECD 2010). These anticipated risks put stress on the urban systems and services, which could lead to social disruption, economic damage to the built environment and health impacts (Carmin et al. 2009). To become sustainable, cities are wise to adapt their urban systems to the expected climate change risks (Bulkeley and Betsill 2013).

It has been recognized that municipalities play an important role in adapting the urban systems to climate change risks (Castàn and Bulkeley 2013, Measham et al. 2011, Bulkeley 2010). Because the authority, resources and networks differ per city and nation, the ways that municipalities fulfill this role vary (Hunt and Watkiss 2011, Smith et al. 2009). Hence, different approaches to address climate adaptation in urban policy are visible in practice. Some municipalities have placed climate adaptation high on the political agenda, installed climate departments with resources and created specific adaptation strategies (see e.g. Rotterdam, London and New York City). These cities were able to apply a dedicated approach to climate adaptation (Uittenbroek et al. 2012). In general, this leads to a fast implementation of strategies and physical measures. Since there is political commitment for climate adaptation, sufficient (human and financial) resources are allocated to accelerate implementation (Uittenbroek et al. 2012, Bierbaum et al. 2013). However, due to overfull political agendas and limited investment capacity, not all cities can or are willing to apply a dedicated approach to address climate adaptation. In order to still address climate adaptation, several municipalities have chosen to integrate climate adaptation directly in existing policy domains and related organizational processes. In literature, this is also referred to as 'mainstreaming' (e.g. Juhola 2010, Bulkeley et al. 2009). The aim of mainstreaming climate adaptation is to search for policy linkages between climate adaptation and existing policy objectives, and to combine resources. The mainstreaming approach is considered to lead to more effective and efficient policymaking (Kok and De Coninck 2007).

Despite the aim of mainstreaming climate adaptation at the municipal level, several researchers have reported on barriers that hamper current adaptation practice (e.g. Rijke et al. 2012, Moser and Ekstrom 2010, Adger and Barnett 2009). Most of these barriers appear to occur during implementation (Biesbroek et al. 2013). The linkages made between climate adaptation and the policy objectives of various policy departments (e.g. spatial planning, water management, public health) in policy documents do not automatically

translate into implementation. Policy implementation is not solely determined by policy documents, as there are many other factors that could influence the implementation. For example, the way actors involved in the implementation process interpret and respond to these policy documents (Grin 2010, Sutton 1999). Although these actors might support these linkages made by policy-makers, reallocating resources as well as reorganizing practices to support this new demand often proves difficult. New policy initiatives require the reconfiguration of organizational structures and hence, a change in the allocation of resources and benefits to the actors involved in the implementation process (Sutton 1999). For this, it is necessary to identify patterns of interaction among actors and coordination of perspectives, interpretation and knowledge (Storbjörk 2010). Organizational routines provide structure for coordination and interaction between actors within an organization – e.g. concerning resource allocation, distribution of responsibilities, and adopted and preferred practices. Analyzing routines can provide insight into the ability or inability of organizations to adapt to changing situations (Feldman 2003). While routines are useful as standardized procedures can optimize the output, this standardization can also make routines rigid and difficult to change (Sydow et al. 2009). Organizational routines could then hamper new challenges, such as the mainstreaming of climate adaptation. Nevertheless, a change in organizational routines at the implementation level is probably necessary to support the mainstreaming of climate adaptation in various policy departments.

The aim of the chapter is to develop a conceptual framework to better understand the role of routines as possible barriers to organizational change. By taking routines as units of analysis, it is possible to capture either stability or change in the organizational processes of, for example, a municipality (Becker et al. 2005). An analytical framework based on four self-reinforcing mechanisms is introduced to explain how routines can form a barrier to mainstreaming. A case study of an implementation process in the City of Amsterdam, The Netherlands, is used to illustrate organizational routines as possible barriers.

5.2 THEORY

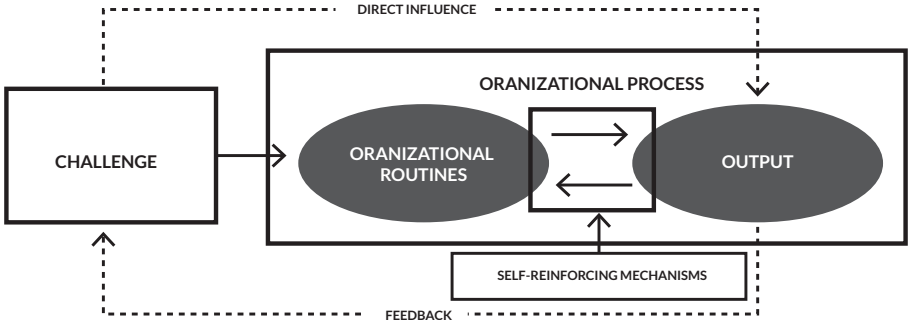
Similarly to any other organization, municipalities embed their initial choices and actions in routines (Sydow et al. 2009). For example, policy departments standardize the allocation of resources and distribution of responsibilities, objectives and practices, and preferences for certain practices, in order to obtain a specific outcome. Routines are 'repetitive, recognizable patterns of interdependent actions' (Feldman and Pentland 2003 p.93) which can be distributed across an organization, as the multiple actors carrying out these routines belong to different organizational units (Becker 2004 p.647). The advantages of organizational routines are that they provide patterns for interaction among actors and coordination in perspectives and knowledge, but also objectives and activities (Becker 2004, Becker et al. 2005). As a result of standardization

of the routines, they can exhibit continuity over time (Pentland and Feldman 2005) and withstand attempts to significantly change them in the short term (Scott 2008). This is a paradoxical quality of organizational routines (Feldman and Rafaeli 2002). In the case that new challenges (are expected to) affect the (social) order, actors probably need to change their routines. During the attempt to address the challenge using the current routines, problems with coordination and a lack of interaction between actors might occur, resulting in an implementation deficit (Pressman and Wildavsky 1973, Sabatier 1986). To achieve an output that addresses the challenge, a change in routines is necessary. Sydow et al. (2009) argue, however, that organizational routines are difficult to change and even frequently hamper the desired change in organizational processes.

In this chapter, the mainstreaming of climate adaptation is considered to be such a challenge that it needs to be addressed in an organizational process; here an urban planning process (figure 5.1). Initially, the involved actors will attempt to address the challenge within existing organizational routines. This will lead to an output; ideally, that climate adaptation measures will be implemented in the urban development. However, it is also possible that these routines will generate an output that does not address the challenge, as the routines are not designed to generate the desired output. Furthermore, the challenge can also directly influence the output, providing positive or negative feedback against which the organizational routines will be attuned. Furthermore, the output can lead to new challenges.

The way that organizational routines can hamper change in organizational processes can be understood through the concept of self-reinforcing mechanisms, which finds its origins in path-dependency literature. Several researchers have argued that routines change in a path-dependent manner (Becker 2004, David 1997) and by doing so, highlight the importance of feedback effects. Self-reinforcing mechanisms result in positive feedback for the output. Since the self-reinforcing mechanisms derive from the field of economics, this positive

Figure 5.1 | Conceptual understanding of organizational routines



feedback is mainly seen in terms of economic benefits such as increasing returns or reduction of costs. To secure or increase this positive feedback, actors tend to adopt or attune routines. However, actors not only adopt or attune routines based on economic benefits. In a municipal organization, routines might also be attuned based on other (e.g. political or social) benefits.

In literature, several self-reinforcing mechanisms can be found. In this chapter, we use the four self-reinforcing mechanisms identified by Sydow et al. (2009) as these mechanisms can be used to understand the conditions and dynamics of organizational routines. The four self-reinforcing mechanisms are complementary effects, coordination effects, learning effects and adaptive expectation effects. According to Sydow et al. (2009), one or a combination of several self-reinforcing mechanisms can be used to explain how routines can hamper change in organizational processes. We are aware that these four self-reinforcing mechanisms will not explain all possible barriers to organizational change in favor of mainstreaming. Nevertheless, understanding how these self-reinforcing mechanisms in routines work, can provide new insights in how organizational barriers occur and possibly assist in establishing strategies that facilitate the mainstreaming of climate adaptation in organizational processes of various policy domains. It is explained below how each self-reinforcing mechanism is expected to lead to positive feedback and accordingly, how routines can hamper the organizational process as a result of the mechanism.

Complementary effects | These are obtained by establishing synergies in one or more interrelated resources and practices (Sydow et al. 2009). These effects are based on the concept of economies of scale - i.e. the idea that the costs of producing two or more products are lower than the costs of producing them separately. Hence, actors can save costs by combining resources and practices. This is considered to be efficient. Yet, these effects can lead to a possible barrier when the resources and practices are interconnected in such a way that a certain type of synergy becomes dominant. Over time, this synergy becomes deeply rooted in the organization, for example by earmarking resources specifically to a practice. The adoption of an alternative synergy is only considered in the case that this synergy is in some way superior to the dominant synergy, because according to Arthur (1994) an inferior synergy will not be considered an option. This suggests that it will be difficult to add new practices, such as climate adaptation in our example. Mainstreaming climate adaptation might thus only occur if the synergy between climate adaptation and the other practices is considered superior by the actors involved in the organizational process.

Coordination effects | These arise as more actors adopt and follow the same rules (Sydow et al. 2009). Rules make it possible to predict the behavior of others in the process (Becker et al. 2005). Consequently, the interaction between actors becomes more efficient as they can anticipate each other's moves and so hasten up the process. Therefore, more rules are put in place to guide this

interaction. This self-reinforcing mechanism can also lead to an overproduction of rules or rules that are too strict (Sydow et al. 2009). As a result of this, routines become fixed and inflexible. This can limit actors in the process as they have to follow the rules, without being able or without aspiring to act outside the rules. Actors who are willing to mainstream climate adaptation can accordingly experience difficulties in coordinating with other actors. An example of this is that the rules clearly state the responsibilities of each actor. This can be problematic in the case of mainstreaming climate adaptation because actors sometimes need to take up responsibilities related to other policy domains (e.g. designers of public space have to consider water management). Other ways of interaction might be necessary, but due to strict rules, routines might not be flexible enough for actors to act upon new challenges such as mainstreaming climate adaptation.

Learning effects | These hold that the more often a routine is used, the more familiar actors become with it and learn to do the routine more effectively. Generally, actors will apply small iterations to optimize the routine further (Sydow et al. 2009). These small learning effects are referred to as exploitative learning. The aim of this kind of learning is to increase the simplicity of the process through which the process becomes easier or faster to implement. Actors can become fixated on optimizing the existing routine and accordingly, pay no attention to other practices such as climate adaptation. Learning through small iterations discourages the motivation to apply explorative learning. Explorative learning aims at innovation by exploring other opportunities outside the existing routine (e.g. using green solutions instead of sewer pipes to discharge stormwater). This kind of learning is probably necessary to explore routines that mainstream climate adaptation and can also be considered effective and efficient, so that it can compete with the dominant synergy in the organizational process.

Adaptive expectation effects | These are based on the idea that the preferences of actors are not fixed, but vary to respond to the expectations of other actors (Sydow et al. 2009). Actors often adjust their preferences in order to gain legitimacy for their actions. Legitimacy helps in advancing the process, as there is shared support for the decisions and actions (Suchmann 1995, Wejs et al. 2013). There is the possibility that the preferences are based on 'expectations of expectations' (Sydow et al. 2009). If a routine is based on expectations of expectations, this can possibly hamper the process. For example, actors may adapt their preferences on their assumptions of the expectations of others without confirming whether or not this assumption is correct. Decisions are then made based on false legitimacy. This can result in inertness or unnecessary adaptations that obstruct rather than assist the organizational process. Hence, the mainstreaming of climate adaptation probably depends on whether or not there is legitimacy – i.e. shared preferences – on how to address mainstreaming.

Each self-reinforcing mechanism can lead to both positive and negative feedback. By responding to positive feedback through constantly attuning the routines to secure this feedback, routines can become rigid and inflexible. In our analytical framework, we consider that each self-reinforcing mechanism can develop a routine in a possible barrier to change (see table 5.1). Routines can hamper the desired change in organizational processes if self-reinforcing mechanisms have evolved in dominant synergies, too many or strict rules, exploitative learning patterns and decision-making based on expectation of expectations (false legitimacy).

5.3 DATA AND METHODS

To illustrate how the four self-reinforcing mechanisms in routines can create barriers to the mainstreaming of climate adaptation, we selected an urban planning process in which actors were assigned to mainstream climate adaptation measures to urban flooding in the current routines relating to street maintenance. We studied the routines in an organizational process in the City of Amsterdam, The Netherlands. In the process, the actors aimed to implement measures which were to collect and discharge stormwater in an alternative way to traditional grey infrastructure (i.e. sewer pipes). Examples of alternative measures are retention and detention ponds, permeable pavement, water crates, tree trenches and green roofs. These kinds of measures are also referred to as low impact development (LID) or green stormwater infrastructure (GSI) practices (US EPA 2014). In this chapter, the term of GSI is applied to refer to these climate adaptation measures. Within the municipality of Amsterdam, this initiative to implement GSI is referred to as the 'waterbestendige weg' – the water retention road. The water retention road should be understood as a concept, since the GSI practice applied to collect and discharge stormwater is not fixed and can, therefore, be different for each street maintenance project. Because the focus is on the implementation of GSI measures instead of the traditional grey infrastructure, the case is appropriate to illustrate if and how organizational routines at the implementation level can hamper the mainstreaming of climate adaptation.

To understand the organizational routines in street maintenance projects, 15 in-depth interviews were held with actors from the City district, the water

Table 5.1 | Analytical framework

Self-reinforcing mechanisms		Possible barriers to change
Complementary effects	→	Dominant synergies
Coordination effects	→	Too many/ too strict rules
Learning effects	→	Exploitative learning
Adaptive expectation effects	→	No legitimacy

company[24], the City's spatial planning department and bureau of engineering in the period of May to June 2013 (see Appendix E for a list of interviewees). The actors were asked about their practices, the resources available to them, the rules and norms they followed and to what extent these were flexible, their capability to learn and alter practices; their preferences on addressing urban flooding (as a result of climate change), and the expectations of others involved at the implementation level about this. The focus of this chapter was on the current routines in the organizational process. During the first interviews, we learned that there had been not one but three attempts to implement a water retention road since 2012. We did not consider this as a problem but rather as a sign that barriers existed. By applying the snowball sampling technique, we came into contact with actors who were involved in one or more of these attempts. Interviews were conducted until the point of saturation. During the analysis some of the interviewees were approached by email to elaborate our understanding of some technical issues. In addition, we studied several policy documents, visited the proposed locations and attended a design workshop related to one of the attempts. The workshop was attended by 20 people from six different organizations, such as the water company, city district and consultancy bureaus. The design workshop was hosted by the makers of the program 3Di[25]. The design workshop provided an overview of available GSI and how the GSI would collect and store various amounts of stormwater.

5.4 FINDINGS

5.4.1 Introduction to the case

The initiative to implement a water retention road (or GSI) derives from the program 'WATERgraafsmeer'. The program aims to address the urban water challenges in the Amsterdam neighborhood Watergraafsmeer by establishing a network for citizens, entrepreneurs and local government. The program was set up by City district Amsterdam East and the water company (WATERgraafsmeer 2014). One of the urban water challenges is that the change in climate will lead to an increase in (extreme) precipitation events. In order to deal with this, more water retention capacity is necessary. Since 2012, the two actors have tried to implement GSI (Municipality of Amsterdam 2012ab). The aim is to do this within existing organizational processes (such as street maintenance). It is hoped that, with mainstreaming, political and/or administrative involvement can be avoided. Moreover, in such a way it can be illustrated that it is possible to implement these measures with the same amount of resources (Interview W2[26]). Thus far,

[24] The water company, Waternet, is responsible for the entire water cycle in Amsterdam and surroundings and does this on behalf of the City of Amsterdam and Water Board Amstel, Gooi & Vecht.

[25] Developed by TU Delft, 3Di is a system for high speed hydraulic computations that can assist in decision making related to water management (3Di Waterbeheer 2014).

[26] Each interviewee is given a code of a letter and a number. The letter indicates a type of actor: W = water, CD = city district, SP = spatial planning department, IBA = engineering bureau. A list of interviewees can be found in Appendix E.

there have been three attempts to implement GSI: 'Stephensonstraat', 'Burmanstraat' and 'Betondorp'.

The first attempt to implement the concept was the Stephensonstraat. This street is situated in an urban renewal project. This provided an opportunity to implement GSI in line with the other development taking place (which was mainly office development). The GSI practice applied in this street would be the use of permeable pavement in combination with an underground tank for water retention. The norms were set upon a storage capacity of 2400m2 but the road was only to carry 540m2 and needed to be supplemented by a traditional storm sewer. This supplement was also necessary as there were no adaptation measures at building level that could assist in delaying water discharge (Municipality of Amsterdam 2011ab). The costs for implementation were estimated to be an extra 50.000 Euros compared to a traditional approach. Although there was a detailed plan, it was not implemented because the planning of the urban renewal project had outpaced the planning of the water retention road – i.e. the project developers wanted to finalize the project and needed the street to be ready with or without GSI (Interview W4). In this attempt, the actors failed to implement GSI practices in the organizational process (no output).

After the first attempt had failed, the water company asked the City district if there were other locations up for maintenance. The street Burmanstraat was about to be dug up to implement a separate water system (opposed to a mixed storm- and wastewater system). And although the Burmanstraat did not really fit the profile – it involved a groundwater problem rather than a stormwater problem –, the City district and the water department decided to explore alternative options to collect and discharge stormwater. Several alternatives have been proposed by the Engineering Bureau of Amsterdam (IBA) for this street, for example water crates and deep infiltration (Interviews IBA2, CD1). Finally, the measures taken are alterations to the street design – i.e. the street profile is W-shaped with elevated curbs that enable a storage capacity on the street of 170 m3 – and a storm sewer that collects water from the surrounding rooftops and the street (Email correspondence with CD1, November 2013). The street profile will provide additional storage capacity to the storm sewer, but will still be discharged via the sewer. While this is a creative solution for creating water storage, it does not correspond with the GSI principles – i.e. recreating natural landscape features and minimizing effective imperviousness of the built area (US EPA 2014). On the other hand, it does provide a temporary solution in the event of urban flooding. Based on these two arguments, actors have been limited successful in changing practices in the organizational process (some output).

Betondorp was appointed as another possible location to implement GSI. Betondorp is a small neighborhood in the East of Amsterdam and was also up for maintenance – i.e. the sewer system was in need of replacement and the public space needed to be updated. At the time of research, several alternatives

had been designed and tested with a simulation program, called 3Di water management, in a design workshop (Design Workshop Betondorp 2013). By the end of 2013, plans were made for a part of the neighborhood. This includes the greening of four public squares, the implementation of several rain gardens and green roofs on sheds, and most street profiles are made hollow. In the case that the street is located near a ditch, the stormwater is discharged towards it. Several other plans for the distribution of rain barrels, a pilot project for permeable pavement and possible water storage in the main square were still being considered at the time of research. It needs to be pointed out that this attempt is different from the other two attempts: in addition to it containing a whole neighborhood, the City district and the water company have allocated extra funding to implement GSI. By doing this, the actors have created an opportunity to progress the implementation of GSI. At the time of research, a final decision that would launch the implementation of GSI in Betondorp had not been taken. It could nevertheless be argued that in the case that these plans are realized, the actors could be successful in implementing GSI practices in the organizational process (output).

It should be noted that all three cases deal with different technological complexities due to the density of the city, which translates in an underground full of cables, pipes, tree roots and more. This complexity influences the number of possible measures as well as the design, the implementation and the maintenance of the selected measures. The implementation of GSI entails technological barriers as well as organizational barriers. This chapter will nevertheless only focus on the organizational barriers, as our aim is to develop our conceptual understanding of how organizational routines can form possible barriers to organizational change. In the following four paragraphs, the analytical framework of the self-reinforcing mechanisms is applied to the case study in order to illustrate this.

5.4.2 Complementary effects

Complementary effects are obtained through combining practices and resources and in this way, establishing synergies. In the case of street maintenance, there is a synergy in which the municipality notifies actors who have assets on or under the street, such as the water company (sewer system), the street department (public space), network administrators (e.g. telecom companies) and pipeline operators (e.g. energy companies) to provide an opportunity to maintain their assets. In this way, these actors are sharing their costs, as they do not have to dig up the streets separately to maintain their assets and there are fewer disturbances for the residents. The objective of realizing GSI was added to this already existing synergy. This was considered as an opportunity to coordinate the collection and discharge of stormwater above and below ground, as all policy departments responsible for practices above and below ground were involved in the existing synergy for street maintenance. In this way, it was

possible to seek ways together to address urban flooding other than the traditional grey infrastructure.

However, several routines in the organizational process have become rigid as a result of the established synergy and accordingly, hamper the implementation of GSI. This becomes visible, for example, in how actors are allowed to spend their budgets. For example, the water managers have a budget for the construction and maintenance of sewer pipes. The budget is specifically labeled to do exactly this; other practices cannot be realized with this budget. As the asset manager of wastewater said: "it has been clearly recorded how we can spend the sewer levies, it cannot just be spent on fun projects" (Interview W3, also W2). An urban designer of the city district said: "it is a shame that we cannot transfer maintenance budget into budgets for implementation. This could lead to new impulses" (Interview CD3). This illustrates how fixed budgets create a barrier. On the other hand, a program manager of the water development said that the transfer of budgets does happen occasionally: "in some new developments they [project developers or the municipal spatial planning department] have insufficient resources and they ask me if I want to join. Then opportunities arise to do something together on the topic of, for example, climate adaptation" (Interview W8). The project manager of Burmanstraat stressed that the investment in GSI needs to be effective, otherwise "I continue in the traditional way" (Interview CD1).

Another consequence that is endorsed through complementary effects is that the timelines for implementation of all practices are linked. In the established synergy of street maintenance, actors are familiar with the timelines of the other practices and have coordinated these. At least the first time, the design and implementation of GSI probably requires a longer process, which might slow down the other practices. In other words, the design and implementation process of GSI will be out of step with the planning of other practices in the process. This happened, for example, in the Stephensonstraat. According to the water company: "there was a plan [to implement GSI] but it was outpaced by the planning [of the office development]" (Interview W4). As a result traditional grey infrastructure was implemented. Routines on how to implement grey infrastructure were already in place and hence, could be implemented in a relatively easy and fast way. This problem of time planning was also acknowledged by the project manager of the Burmanstraat who said that "[when] the implementation date is coming up, this means that we need to start the project soon (…) and if we have not figured it out by then (…) well then we cannot implement it. And there is where it [the possible implementation of GSI] stops" (Interview CD1). The case illustrates that there is a dominant synergy that supports grey infrastructure in the organizational process of street maintenance.

5.4.3 Coordination effects

Coordination effects occur when actors follow the same rules. All the actors involved in the organizational process follow the rules within their discipline. The water company has the task of collecting and discharging stormwater in the public space. Overall, this is done by a sewer system for which they follow the norm that the system should be capable of collecting and discharging a T=2 downpour[27] (Interview W1, W4). The urban designers of the city district follow the local handbook for the design of public space (in Dutch 'Handboek Inrichting Openbare Ruimte') which describes amongst others standardized street profiles (Interview CD3). The project and program managers responsible for construction and maintenance of public space follow the norm of whether or not the measure is technically and financially feasible (Interview CD1, CD2, W8 and IBA1).

These rules provide a consistent coordination showing which actor is responsible for what in street maintenance: "the city district is responsible for a decent public space, and the water management makes sure that excessive storm and waste water is adequately discharged" (Interview W8). These are the rules for the allocation of responsibilities, but this allocation does not seem to work in the case of the implementation of GSI. For example, in the Stephensonstraat case, it was at first unclear who was responsible for implementation and maintenance of the permeable pavement; the pavement is a responsibility of the city district but it assists in water discharge which is a responsibility of the water company. Finally, it was decided that for maintenance, the responsibility was divided between the city district (regularly) and water management (periodically) (Municipality of Amsterdam, 2012ab). The budget holder of the water company argued, however, that this new responsibility does not fit the existing routines of the water company: "in reality we are not proficient to do so: we don't have the equipment or the budget" (Interview W8, also W2).

The example illustrates that some GSI practices might not fit the current routines. In the case of permeable pavement, the routine of "the water company 'works underground' and the city district 'works above ground'" is problematic and hampers the implementation of GSI. In The Netherlands, the municipalities have a legal responsibility to collect and discharge stormwater. According to article 3.5 of the Dutch water law, municipalities are nevertheless free to some extent in determining how to do so; it does not necessarily have to be done underground in a sewer system and it does not imply that the water company is the only one responsible. The strict allocation of responsibilities in this example might then also be an interpretation of the rules by the actors themselves or a

[27]This is a downpour that is expected to occur once in every two years. In The Netherlands, the storm sewers are generally designed on a downpour with an intensity of 60 or 90 l/s/ha (i.e. 21,6 mm/hr or 32,4 mm/hr). The system should easily deal with a T=2 downpour without resulting in water nuisance. Water nuisance or flooding occurs respectively with T=10~25 and T=50 downpours (RIONED 2006).

result of the organizational structure (i.e. the allocation of tasks and resources to policy departments) of the municipality.

5.4.4 Learning effects

Learning effects can derive from exploitative or explorative learning. Presumably, the mainstreaming of climate adaptation requires explorative learning, as actors have to deal with the implementation of GSI practices that they are less or not familiar with. Many of the actors understood the value of pilot projects, which is a way of explorative learning. An actor said about the Stephensonstraat: "there was an idea to create water storage under the road and to make a pilot out of it. We will learn a lot from it and that is great" (Interview W4). The strategic planner of the water company said: "if you have more money, you can improve your tricks. But it is not about that; it [the pilot] is about collaboration, combining resources, to find alternative ways to govern" (Interview W5).

However, not all actors are showing a similar urge to invest in explorative learning. Some argued that actors involved in maintenance are often "less visionary and more pragmatic" (Interview CD3, also CD1, IBA1 and W7). In the case of maintenance, the aim is to sustain, not improve, the quality of public space. These kinds of values do not stimulate explorative learning. Someone at the water company pointed out that "innovation needs to have a cause. (…) You will get hobbyism if you provide too much room to explore" (Interview W3). A colleague supported this by stating "in this company, we are exceptionally good in defining pilots – if we are not clear on the consequences, then we are quick in calling it a pilot. Only, when does the pilot end, how do we evaluate it and what do we do with the results? Nobody ever speaks of that. We are exploring unknown territory and in general, that can be interesting for an organization providing that it is thought through" (Interview W8). This illustrates that some of the actors remain somewhat reluctant to participate in explorative learning processes (pilot projects) which hampers the learning processes needed to explore routines for the implementation of GSI and hence, ways to mainstream climate adaptation.

5.4.5 Adaptive expectation effects

Adaptive expectation effects occur when actors alter their preferences to respond to expectations of others in order to build legitimacy. The policy advisor of the water company says that "presenting a larger picture could mean more legitimacy" (Interview W2). Someone else at the water company expects that legitimacy for GSI can be built by exploring a combination of these measures: "Betondorp is [not just one street, but] a neighborhood and it would be weird to just apply one measure there. We could look at several measures and learn how we can deal with these [measures in maintenance]" (Interview W4, also

W3). Yet, as described in the former paragraph, there are conflicting preferences for the use of pilot projects. Hence, the expectations of one actor might not coincide with the preferences of other actors involved in the organizational process.

Also, there are possible 'expectations of expectations' related to the idea of taking responsibility in a pilot project that forms a barrier to establishing legitimacy for the mainstreaming of climate adaptation measures. For example, a budget holder of the water company said: "the consequence of this [allocation of responsibilities in which the water company pays more or all of it] is that next time the city district comes to me and says: 'we are doing similar things elsewhere and we expect to make similar agreements as we did last time [in the pilot project]'" (Interview W8). The budget holder expects that because the water company had the resources for the pilot project once, the city district might expect that they always have the resources. Because the budget holder is expecting this to be the preference of the city district, he is reluctant to participate.

That this is not a strange expectation is confirmed by a project manager from the city district: "if you want to be innovative in these kinds of things [alternative measures for water retention], then you would expect that they take the lead. They are the water company and they want a sustainable water system. So in that case, I think: 'take action!'" (Interview CD1). The project manager argues the obvious; it is a water issue, so the water company is responsible. These expectations seem to reflect the earlier discussed routines regarding responsibilities in paragraph 5.4.3. But with this expectation, the project manager disregards the fact that the design of public space affects the extent to which water can inundate into the ground directly. This is, amongst other things, why the water company does not want to be the only one responsible and argued that GSI practices can be implemented integrally in street renewal projects; making other actors also responsible for climate adaptation (Interview W5, W8). The example illustrates that as long as the actors base their expectations on current routines, it remains difficult to mainstream climate adaptation.

5.5 DISCUSSION

It is notable that all of the actors interviewed are open to implementing GSI practices, they understand that this needs to be addressed at the implementation level, and that this possibly involves the organizational processes that they are involved in. For mainstreaming, this willingness to act is important, as change requires motivation and energy (Sutton 1999). Although the actors are willing to explore new practices, they also state clearly that there are limits to the extent that they can support and take responsibility for the new practices. The organizational routines that are currently in place are considered by the actors to be efficient and effective. To alter organizational routines without

being sure if the process is going to be effective and efficient makes actors at the implementation level, who are generally considered pragmatic, reluctant to change. For them, the current organizational routines – although based on dominant synergies, strict rules, exploitative learning and expectations of expectations – secure a legitimate output. Even if the aim is to mainstream climate adaptation into existing policy domains and related organizational processes, actors at the implementation level (but most likely also at other levels) need to still consent to this with attuned or new organizational routines. This process will be slow as legitimacy among actors needs to be built for new synergies, shifted responsibilities and new patterns of resource allocation (Wejs et al. 2013, Sutton 1999).

However, the case illustrates that over time, the routines and output are changing in favor of mainstreaming climate adaptation. It has been argued before that the mainstreaming of climate adaptation needs to occur based on performance – as opposed to conformance (Uittenbroek et al. 2012). Where conformance focuses on the concurrence between intentions and output, performance provides the actor with the possibility of assessing a situation in relation to the intentions and allows solutions that fit the context (Faludi 2000). By not requiring conformance immediately but focusing on the three stages of performance, the actors can gradually build legitimacy for the mainstreaming of climate adaptation. First, actors become acquainted with new practices, then they will consider the need for these practices and finally, consent to the practices necessary (van Doren et al. 2013). The three attempts illustrate a variation of these stages (table 5.2). In the first attempt, the actors explored GSI practices and were in the stage of considering the need, but this stage was cut off due to time planning of the overall project. In the second attempt, GSI practices were again explored and the need considered, but there was no consent on GSI practices. In Betondorp, there is consent to implement GSI practices: the city district and the water company even assigned additional resources to overcome barriers created by self-reinforcing mechanisms in the routines. These additional resources allowed for more time to develop expertise and experience with GSI practices and see how they can fit current organizational routines. In this way, the GSI practices and with them the mainstreaming of climate adaptation can become a legitimate output and organizational routines will be adopted or attuned in order to support the output and become effective and efficient again.

Table 5.2 | Mainstreaming and a change in routines

	Attempt	**Changed routines?**	**Mainstreaming (performance-based)**		
1	Stephensonstraat	No	Acquaintance	(Consideration)	
2	Burmanstraat	No	Acquaintance	Consideration	
3	Betondorp	Yes, extra resources	Acquaintance	Consideration	Consent

It could be questioned whether the first two attempts only failed as a result of organizational routines or that possible other (context-specific) barriers can be appointed. For example, if there would have been more time to develop the ideas for GSI practices in the first attempt; this might have resulted in implementation. However, this limitation of time derives from a complementary effect: a synergy between multiple objectives. In an established synergy not all objectives will have similar priority; the objective with the most priority will put time constraints on other objectives. As a result, actors will consider how much is possible within the time frame available to them. Many of the barriers relate to the coordination and interaction between actors and therefore, much can be explained by looking at the organizational routines and the self-reinforcing mechanisms.

Furthermore, although the actors at the implementation level showed willingness in implementing GSI practices, they might not have the ability to change their organizational routines. Actors can participate in the pilot projects and bring in practical knowledge on how the organizational routines are currently organized and what alterations in routines might be necessary, but for example additional financial resources for pilot projects (as provided in Betondorp) are decided on by others higher in the municipal organization (e.g. the mayor and aldermen or the head of the policy department) (Kingdon 2002). Hence, the involvement of other actors in the municipal organization is necessary to change the organizational routines. The involvement of other actors can lead to new resources and skills that might not exist in the current organizational routines.

5.6 CONCLUSIONS

The aim of this chapter was to investigate the role of organizational routines as possible barriers to the mainstreaming of climate adaptation at the implementation level. By doing so, providing a more in-depth understanding of what types of barriers can arise during implementation and moreover, why these barriers occur, as this type of research has been missing in literature thus far (Biesbroek et al. 2013). An analytical framework of self-reinforcing mechanisms has been used to explain how organizational routines can, on the one hand, provide positive patterns for coordination and interaction, but can also imply dominant synergies, strict rules, exploitative learning and false legitimacy. These barriers arise because the current organizational routines are not designed to mainstream climate adaptation. Consequently, climate adaptation ideas and practices need to become part of the organizational routines. A change in organizational routines will take time as the change needs to be considered as effective and efficient. In order to stimulate this change, the focus needs to be on legitimacy building. This might require additional resources, concurrent with the involvement of others higher in the municipal organization, in order to set up learning processes that encourage the development of expertise and experience regarding climate adaptation practices.

Although the research provides interesting insights in the role of organizational routines as possible barriers to mainstreaming climate adaptation, we encourage other researchers to apply the analytical framework of self-reinforcing mechanisms on other cases. This could lead to the identification of other self-reinforcing mechanisms and assist in highlighting relations between the mechanisms. Furthermore, we are aware that the framework of self-reinforcing mechanisms presented in this chapter is not unique to the mainstreaming of climate adaptation. Further research is necessary to learn whether particular mechanisms are more challenging in the context of climate adaptation. By doing so, it will be possible to explore more precisely in what ways organizational routines need to be changed in order to support the mainstreaming of climate adaptation.

CHAPTER 6 | Stimuli for climate adaptation in cities: insights from Philadelphia – an early adapter

Abstract | *An in-depth understanding of climate adaptation stimuli is currently lacking in literature as most research has focussed on barriers to climate adaptation. Moreover, little is yet known about the reason why certain governance approaches to climate adaptation emerge. The aim of this chapter is to identify stimuli for climate adaptation in cities and more specifically to examine how these stimuli influence the governance approach to climate adaptation – dedicated (adaptation as a new policy domain) or mainstreaming (integrating in existing policy domains). For this explorative case study research, an early adapter was selected: Philadelphia (USA). By reconstructing the organization of two climate adaptation programs, we have identified stimuli and how they influenced the city's governance approach. The reconstruction is based on data triangulation that consists of semi-structured interviews with actors involved in these programs, policy documents and newspaper articles. The chapter illustrates the importance of stimuli such as the strategic framing of climate adaptation within wider urban agendas, political leadership, and institutional entrepreneurs. In addition, the chapter reveals that it is the combination of stimuli that influences the governance approach to climate adaptation. Some stimuli will specifically trigger a dedicated approach to climate adaptation, while others initiate a mainstreaming approach.*

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6.1 INTRODUCTION

Several cities[28] have already demonstrated awareness of the potential risks of climate change and have organized municipal responses to climate adaptation; see for example New York, Philadelphia, Chicago, Vancouver, London, Rotterdam and Copenhagen (Castán Broto and Bulkeley 2013, Bulkeley and Tuts 2013). With their responses, these early adapter cities aim to anticipate the expected changes in climate, such as an increase in temperature, more (extreme) precipitation events and sea level rise (IPCC 2014); and circumvent possible associated consequences such as economic damages induced by urban flooding, and social disruption due to heat stress. Many researchers have argued that cities should start adapting to climate change today in order to avoid the high costs that are associated with future damages (Runhaar et al. 2012, Tompkins et al. 2010, Parnell et al. 2007). By addressing these consequences of climate change, these cities have taken up a major challenge in urban policy. However, many other cities have not done so thus far (Reckien et al. 2014).

In climate adaptation literature, the focus has largely been on why these cities have not been able to address climate adaptation. This has resulted in many studies on the identification and understanding of barriers to climate adaptation. Frequently mentioned barriers are, for example, uncertainty about the risks and impacts, limited financial resources, little local expertise, a lack of political support, and an undefined role for local governments (Bulkeley and Betsill 2013, Runhaar et al. 2012, Moser and Ekstrom 2010, Amundsen et al. 2010, Sippel and Jenssen 2009). By focusing mainly on the barriers to climate adaptation, the role of stimuli has been largely ignored. By stimuli, we refer to factors that have triggered climate adaptation responses in cities. It is expected that the early adapters have experienced stimuli that have increased their inclination to respond to climate adaptation, and subsequently assisted in avoiding or overcoming barriers. Hence, the identification of these stimuli for climate adaptation responses is also relevant for understanding and addressing the barriers to climate adaptation. In addition, we want to explore whether the stimuli influence the city's governance approach to climate adaptation. The stimuli encountered by an early adapter might explain why one city applies a more dedicated approach to climate adaptation (i.e. climate adaptation is presented as a new policy domain with direct political commitment, allocated resources and specific adaptation policies) while another city follows the mainstreaming approach in which the focus is on establishing synergies between existing policy objectives and climate adaptation, and combining resources (Uittenbroek et al. 2014, Kok and De Coninck, 2007). By addressing this knowledge gap, we provide more in-depth insights into the stimuli.

The aim of this chapter is twofold, as we identify stimuli that have triggered climate adaptation in cities and explore whether the identified stimuli have

[28] In this chapter, city is used in order to refer to municipality or local government.

influenced the governance approach. To clarify, our aim is not to qualify the success of the climate adaptation responses or the governance approach taken. The research is empirically illustrated by an explorative case study, which is considered a best practice when it comes to climate adaptation. For the case study, we have selected the City of Philadelphia in the United States. This case selection is based on previous research that has shown that Philadelphia has organized several climate adaptation responses (see e.g. Edwards 2013, Maimone et al. 2011, Rosenzweig et al. 2010), but that did not explain what triggered this city to develop these responses. By reconstructing the organization of two of these responses, we have been able to identify stimuli and gain insight in the city's governance approach. The case study is based on data triangulation that consists of interviews with actors involved in these climate adaptation responses, policy documents and newspaper articles. The research question is as follows: what stimuli have triggered climate adaptation in Philadelphia and how have these stimuli influenced the city's governance approach to climate adaptation? In the next section, a theoretical framework is presented which includes a literature overview of possible stimuli for climate adaptation. This is followed by the research design and introduction to the case study. The following two sections present the qualitative analysis of the stimuli for two responses in Philadelphia (policy programs Greenworks and Green City Clean Waters) and how these stimuli have influenced the city's governance approach to climate adaptation. In the final section, the main conclusions are drawn.

6.2 THEORETICAL FRAMEWORK

Although the main focus in climate adaptation literature has been on the identification and understanding of barriers, few researchers have highlighted possible stimuli for climate adaptation (e.g. Bulkeley et al. 2009, Bassett and Shandas 2010). Thus far, the presentation of these stimuli has been somewhat scattered throughout climate adaptation literature. To provide structure, we developed a theoretical framework by following the questions 'who, when, why and how'. These basic questions assist in identifying the different stimuli for climate adaptation independently as well as allowing for an exploration of whether there are any interdependencies between the stimuli. Additionally, this framework assists in identifying stimuli in the case study. While we aim to be thorough in our overview of stimuli, we want to stress that the overview is not exhaustive.

6.2.1 The identification of possible stimuli for climate adaptation

First, *who* is about the people who initiate the response. In adaptation literature, much attention is given to institutional entrepreneurs (e.g. Wejs et al. 2013), also referred to as policy entrepreneurs (Bassett and Shandas 2010, Bulkeley 2010, Kingdon 2002, Meijerink and Huitema 2010) or local champions (Carmin et al. 2012). These entrepreneurs take up the role of mobilizing other

actors and building legitimacy for climate adaptation (Wejs et al. 2013) and can be positioned both inside and outside the municipal organization (Kingdon 2002). Institutional entrepreneurship is demonstrated by individuals as well as by collectives. Meijerink and Huitema (2010) point out that collective entrepreneurship holds two main advantages as the coalition between people in different positions can apply various strategies and possess a variety of capabilities and tools. Several researchers have argued that without institutional entrepreneurs, the organization of climate adaptation is difficult (e.g. Bassett and Shandas 2010, Betsill and Rabe 2009, Carmin et al. 2012). On the other hand, Bulkeley (2010) points out that while institutional entrepreneurship is important in the initial stages of organizing climate adaptation responses, a broader institutional capacity is necessary to overcome barriers that could derive from party politics or existing organizational structures. The involvement of (elected) politicians is often mentioned as an equally important stimulus in organizing climate adaptation. Politicians who demonstrate leadership can contribute directly by allocating resources (Carmin et al. 2012), but also more indirectly by stimulating learning processes. Politicians, who do actively adapt, might choose responses that are visible quick wins and no-regret measures (such green roofs) in order to increase their political profile (Uittenbroek et al. 2014). However, politicians sometimes also choose to make statements about what should be done in the long run, or apply cover up strategies like setting up new research programs dates for future adaptation strategies instead of proactive adaptation (Termeer 2009). In this way, the politicians avoid taking decisions that could damage them politically (Biesbroek et al. 2009b).

Second, *when* is about momentum. A momentum provides an opportunity in time to adapt to climate change. Kingdon (2002) refers to this as a window of opportunity. In the case of climate adaptation, this can be a calamity or focus event (e.g. a flood or a heat wave), elections or societal pressure (Dannevig et al. 2013, Runhaar et al. 2012). For example, the City of Copenhagen dealt with a cloud burst in 2011. The damage costs of the cloudburst were more than one billion euro. This calamity triggered a response, to invest in climate adaptation measures and develop a specific cloudburst plan (Madsen et al. 2013). Kingdon (2002) argues that it is often a set of circumstances in which the coupling of problems-solutions in a favorable context provides the opportunity for change (Birkman et al. 2010).

Third, *why* relates to the applied narrative or framing that motivates authorities to address climate adaptation. By framing a topic a certain way, it is possible to increase its salience (Entman 1993, Pralle 2009). Fünfgeld and McEvoy (2011) identified four common framings of climate adaptation: the hazard frame, the vulnerability frame, the risk management frame and the resilience frame. Whereas the first two frames illustrate the consequences of climate change and a lack of adaptation, the latter two are more opportunistic as they describe what the city can do or become if it adapts to climate change. In addition to

framing climate adaptation explicitly, Bulkeley and Betsill (2013) argue that several municipal organizations have addressed the need for climate adaptation more implicitly by placing it within wider urban agendas and exploring ways to use existing policy and planning processes to respond to climate change. By using concepts and terms closely related to the current framings in a policy domain, it is possible to signify the relevance of climate adaptation within that domain, and increase the understanding of, and support to act upon climate adaptation (Uittenbroek et al. 2014).

Fourth, *how* refers to the available capability to respond to climate adaptation. The capability to organize climate adaptation responses can take many forms. This can vary from available and allocated resources to political pressure as well as the ability to install new regulations and skills to build networks and coalitions. Smith et al. (2009) argue that climate adaptation cannot be realized with just the existing resource streams and that the mobilization and allocation of resources for climate adaptation needs attention. This requires support for climate adaptation, and the building of new coalitions and networks. However, in order to connect actors that have different values and objectives, the capabilities of advocacy, brokerage and perseverance are probably required (Kingdon 2002, Meijerink and Huitema 2010). Access to such capabilities implies that there are opportunities for negotiation and exploitation.

There are interdependencies between the stimuli as it takes an individual to recognize the momentum, create the narrative and practice the capability. This is not necessarily done by the same individual. By looking at the interdependencies between the stimuli, it highlights the different kinds of people (with various capabilities and tools) who are necessary to organize climate adaptation responses.

6.2.2 Stimuli and their possible influence on the governance approach

The encounter of possible stimuli and exploitation of these stimuli by early adapters may affect the governance approach to climate adaptation. In adaptation literature, two governance approaches to climate adaptation are the dedicated approach and the mainstreaming approach (see e.g. Kern and Alber 2008, Uittenbroek et al. 2014). In a dedicated approach, climate adaptation is understood as a main objective that requires its own resources and special policies. It is considered as a new policy domain. In this approach, the focus is on achieving conformance between the set adaptation goals and the realized outcomes (Uittenbroek et al. 2013). The mainstreaming approach aims to integrate climate adaptation as an objective in existing policy domains. This means that synergies between existing policy objectives and climate adaptation are established and that existing resources are used to address climate adaptation. As opposed to the dedicated approach, mainstreaming focuses on performance-based decision-making – i.e. actors focus on to what extent climate

Table 6.1 | Dedicated approach and Mainstreaming approach

	Dedicated approach	Mainstreaming approach
Agenda-setting	Political agenda	Policy department agenda
Framing	Main objective (explicit)	Added value (implicit)
Resources	New resources (specific bureau)	Existing resources
Policy design	Special policy	Synergies in policy objectives
Implementation	Conformance	Performance

Source | Based on Uittenbroek *et al.* 2014

adaptation is required and feasible within the given context. This could imply that the realized outcome is less than the set adaptation goals, but this is a valid outcome as long as it is based on a deliberate assessment (Uittenbroek et al. 2013, Faludi 2000). In table 6.1, the differences between the two approaches are named. We are aware that other governance approaches are possible as well, for example a hybrid approach in which the two approaches alternate or co-exist within one city (Uittenbroek et al. 2014).

It is expected that not all stimuli for climate adaptation responses described in the former paragraph will result in the same governance approach. For example, not all individuals will have the capability to install a new policy domain with its own resources and policy goals. This might only be the case if politicians show leadership and commit to climate adaptation. In that case, political leadership could be considered as a stimulus that influences a dedicated approach. Other stimuli, such as the use of strategic framing to establish synergies or the presence of institutional entrepreneurs, might then again result in a governance approach that resembles mainstreaming. In the following sections, the case study analysis explores to what extent this proposition about the influence of stimuli on the governance approach can be supported.

6.3 DATA AND METHODS

The analysis presents a singular explorative case study of an early adapter, offering tentative conclusions for stimuli that can trigger climate adaptation responses and the influence of these stimuli on the governance approach. According to Flyvbjerg (2006), a single case study can provide valid research outcomes if the case in question is expected to be rich and illustrative enough. We believe that Philadelphia presents such a case.

The City of Philadelphia is expected to deal with several impacts of climate change, such as an increase in hot weather events in summer, more frequent and prolonged heat-waves, and the increase of heavy downpour events as well as the provision of fresh water for both drinking and industrial use (Bulkeley 2013). From previous research, we learned that the City of Philadelphia is adapting to these climatic changes. For example, together with the non-profit Energy Coordinating Agency, the city installed a heat alert program in 1995

(Kalkstein et al. 1996, Gartland 2008) and more recent responses aim to make the city's infrastructure resilient and reduce combined sewage overflow, which can be worsened by an increase in downpour events and consequently affect the provision of fresh water (Maimone et al. 2011, Bulkeley 2013). Furthermore, the City of Philadelphia participates in the C40 Cities network and produced a climate change action plan in 2007, but this plan mainly focused on climate mitigation measures.

In addition to the climate change challenges, the city has been struggling in the past decades with urban decay due to departing industries, a declining population and an increase in vacant land (Edwards 2014). Through urban regeneration, the population has increased again in the past decade. Yet, the city still has to address social issues like urban degeneration (the city counts around 40,000 vacant parcels) and poverty (28 per cent of the population live below the poverty line) (Interview MOS01[29]).

In December 2013, semi-structured interviews were held with actors responsible for policy design and implementation in various policy domains – sustainability, spatial planning and water management. We asked them to explain how their policy domain was currently addressing climate adaptation. We did not ask the actors to identify stimuli themselves, but rather to provide a reconstruction of the process of policy design and implementation of the climate adaptation response they were working on. For the two programs Greenworks and Green City Clean Waters, the process has been reconstructed. We selected these two programs, because at time of research these were the most actively pursued and hence, furthest in design and implementation.

In total, 17 actors were interviewed. Most of these actors worked for the municipality directly, although some of them were consultants hired for their expertise. A list of the actors and their job positions can be found in Appendix F. Some of the interviews were held in a group meeting with a maximum of five people. Additionally, field trips in Philadelphia were made to study several projects that have been realized within Green City Clean Waters. Two actors were contacted through e-mail as meetings could not be arranged during the fieldwork in Philadelphia. Prior to the interviews, we analyzed all policy documents that related to sustainability, climate change, spatial planning and water management – so this also included responses other than Greenworks and Green City Clean Waters. In addition to the interviews and policy document analysis, we analyzed newspaper articles and other online available material such as websites and You Tube movies.

[29] Each interviewee has received an abbreviation that relates to their policy department and a number: MOS = Mayor's Office of Sustainability, PWD = Philadelphia Water Department. See Appendix F to see the list of interviewees and their abbreviation.

It should be pointed out that although Philadelphia is considered an early adapter, we learned during our fieldwork that the responses were not necessarily taken solely to adapt to climate change. In the following two sections, Greenworks and Green City Clean Waters are introduced. Their policy design and implementation process is reconstructed while using the theoretical framework.

6.4 GREENWORKS

During the elections of 2007, a group of organizations had formed a coalition that focused on creating safer, healthier and cleaner neighborhoods. This coalition was called Next Great City and consisted of 130 organizations with different backgrounds (e.g. environmental, businesses, faith, community, union) (Next Great City 2014). The coalition created a list of ten action steps that would lead to a more sustainable city (see table 6.2). The action steps of reducing sewer backups and flooding (no. 4) as well as replanting trees and creating green lots (no. 7 and 9) are implicitly linked to climate adaptation: sewer backups and flooding are caused by downpours and more green infrastructure can reduce heat mortality and soak up rainwater. The Next Great City coalition was in no way connected to the municipal organization, but demanded political leadership and commitment in making Philadelphia a sustainable city. Because the diverse groups had united in this coalition, they could reach out through different channels and gain support, but at the same time speak with one voice – making their message (the ten action steps) clear for politicians to hear. While all the running candidates for mayor could have picked up this list, it was only picked up by one of them. This person anticipated the action steps and used them to his advantage during his election campaign (interview MOS02). He won the elections and accordingly, as mayor, he showed political leadership by installing a Mayor's office of Sustainability and developing a policy program addressing the ten action steps: this is Greenworks.

Greenworks includes five goals, 15 targets and around 170 initiatives that need to be realized over a period of seven years (see table 6.3). The targets are linked to a metric. For example, the target of providing walkable access to park and recreation resources for all Philadelphians is measured in acres of open space. The metrics provide a way to illustrate the yearly progress in a report. The first report was drafted in 2008 by the then policy director of sustainability and a small group of policymakers working on sustainability (Interview MOS01,

Table 6.2 | Ten action steps of the Next Great City coalition

1. Create Public Riverfronts
2. Expand recycling
3. Improve transit stops
4. Stop sewer backups and flooding
5. Adopt Modern Zoning
6. Use Clean Energy and Construct Energy Efficient Buildings
7. Replant Neighborhood Trees
8. Maintain Healthy Parks
9. Clean and Green Vacant lots
10. Reduce Asthma Caused by Soot

Source | Next Great City 2014

MOS02). They took the ten goals of the Next Great City coalition as a guideline, but also explored what policies the policy departments had already developed that could be placed within the framing of sustainability (Interview MOS02). When the then policy director of sustainability was writing Greenworks, he looked at the first generation of sustainability and climate change plans such as those of New York, Chicago, Toronto and Vancouver (Interview MOS02) and he picked out the elements which would make the Philadelphia plan distinctive. "PlaNYC was multidimensional with six issues and Chicago's plan used metrics [to measure progress]. This spoke to me. So we wanted to take both of these things and put them together. So we ended up with five goals and 15 targets" (Interview MOS02). The selection of these goals and targets was strategic. On the one hand, these derive from existing policies and plans of the Philadelphia policy departments and on the other hand, the aim was to distinguish the Philadelphia plan from other cities. As the then policy director said "I am a strategic policymaker, not a sustainability activist. So I was paying attention to what targets New York did not have and that we could add to our list of goals and targets" (Interview MOS02).

In the early progress reports, climate adaptation is not explicitly addressed. Although targets could be affiliated with climate adaptation (e.g. targets 8, 9, 11 and 13 in table 6.3), an explicit link is not made in the Greenworks reports of 2009, 2010 and 2011. According to a policy advisor at the Mayor's office of Sustainability responsible for the implementation of Greenworks, this was on purpose: "It is a messaging thing. We are doing this [addressing climate change] already and although you might not think climate change is happening, these

Table 6.3 | Greenworks – goals, targets and initiatives

Goals	Targets	No. of initiatives
Energy	1. Lower city government energy consumption by 30 percent 2. Reduce citywide building energy consumption by 10 percent 3. Retrofit 15 percent of housing stock with insulation, air sealing and cool roofs 4. Purchase and generate 20 percent of electricity used in Philadelphia from alternative energy sources	57
Environment	5. Reduce greenhouse gas emissions 6. Improve air quality toward attainment of federal standards 7. Divert 70 percent of solid waste from landfill	32
Equity	8. Manage stormwater to meet federal standards 9. Provide walkable access to park and recreation resources for all Philadelphians 10. Provide walkable access to affordable, healthy food for all Philadelphians 11. Increase tree coverage toward 30 percent in all neighborhoods by 2025	44
Economy	12. Reduce vehicle miles traveled by 10 percent 13. Increase the state of good repair in resilient infrastructure 14. Increase the size of the regional clean economy	28
Engagement	15. Philadelphians unite to build a sustainable future	5

Source | Mayor's Office of Sustainability 2013

things [goals and targets] are valuable in any case. (…) Climate change does not mean a lot to a lot of people. (…) For us, it is about figuring out how it adds value to everyday life" (Interview MOS01). Hence, goals such as energy, environment, equity, economy and engagement, were formulated that could be understood and supported by both politicians and the public. As of 2012, the framing concerning climate adaptation became more explicit and resulted in the aim of developing a special climate adaptation plan. The Mayor's office realized that they must obtain a better understanding of the impacts of a changing climate in order to achieve their resilient infrastructure target (target 13). A special adaptation plan would provide additional arguments to this and other targets of Greenworks (Interview MOS01).

The Mayor's office of Sustainability is responsible for the implementation of Greenworks. The implementation of the plan means largely that the policy makers of the Sustainability office provide expertise and network to the policy departments who have to realize the targets and initiatives. The office has no budget to assist in financing the initiatives which means that policy departments themselves have to fund and invest in the realization of the targets and initiatives. Furthermore, the office makes the yearly progress report, using the metrics to monitor the progress within the policy departments. The metric entails a baseline, the current status and the 2015 target (e.g., target 8 is measured in new greened acres. For this the baseline is zero in year 2011, current status is 102.4 in year 2012 and 2015 target is 450 new greened acres) (Greenworks 2013). The policy departments are responsible for providing the information on the metrics to the Mayor's office (Interview MOS01). For some metrics, the data gathering has been difficult (interview MOS01 2013). According to the then policy director of Sustainability: "[t]he whole idea [of the metrics] was about direction and ambition. And you are going to learn things as you go, and as you go, change the targets. Make them smarter, make them harder, make them easier. Change them, because so you learn" (Interview MOS02). Hence, some of the metrics were subjected to alterations. But after they were officially introduced in the 2012 report, the metrics have not changed. Although the metrics provide a clear measurement for progress, the solution linked to the metric might not necessarily be the only solution to achieve the target. For example, the target to manage stormwater (target 8) is measured in greened acres[30]. PWD, responsible for the metric, spends a lot of time organizing a green acre, while this time could be spent on other measures that manage stormwater but do not necessarily fit within the description of a greened acre (Interview PWD08).

Greenworks' stimuli | During the analysis, we learned what stimuli have triggered Greenworks. Societal pressure in combination with elections provided

[30]A greened acre is an acre in which the first inch of runoff is managed by stormwater infrastructure before it heads towards the combined sewer system. Both the area of the stormwater management feature itself and the area that drains to it, is considered part of the green acre (PWD 2012).

the window of opportunity to initiate a new policy program. The Next Great City coalition played a significant (entrepreneurial) role in forming the goals, but it was the mayor who showed leadership and placed the goals on the political agenda. He is responsible for the installment of the Mayor's office of Sustainability and Greenworks. The framing used in Greenworks is that of sustainability in relation to everyday values (such as economy and equity). Climate change is one of the challenges that influences these values and therefore requires attention. Climate adaptation is considered an extra argument for the work that the Mayor's office is already doing, but is to gain more explicit attention in the future. In terms of capabilities and tools, several can be identified: from political power and human resources, to the metrics. It was the mayor's prerogative to install a special office. Yet, although this office has a specific position and function in realizing Greenworks, it only holds human resources – i.e. five policymakers who can provide networking and lobbying skills, but no financial resources. The metrics are a stimulus to enforce the policy departments that are responsible for a certain target, to realize initiatives. If policy departments do not illustrate their progress in the yearly report, this might be noticed by the readers of the report and result in bad publicity for the department. The nature of the response is largely about visibility and political profiling: showcasing what the city is doing (differently than other cities) concerning sustainability and climate change.

The analysis of Greenworks shows that the stimuli, summarized in table 6.4, have initiated a dedicated governance approach. There is political agenda-setting, a special bureau and policy, and the metrics impose conformance; maybe not conformance between the goal and the outcome, but in terms of how the goal is achieved (e.g. in greened acres). However, it appears that at first, the applied framing is more in line with a mainstreaming approach since climate adaptation is considered an added value to Greenworks' main objective of sustainability. A specific focus for climate adaptation has only been developed recently. This will probably result in responses that more specifically address climate adaptation. The next section will illustrate if similar stimuli and governance approach can be identified in the Green City Clean Waters program.

Table 6.4 | Stimuli for Greenworks

Who	*People*	Next Great City coalition, political leadership
When	*Momentum*	Elections, societal pressure
Why	*Framing*	Sustainability in relation to energy, environment, equity, economy and engagement
How	*Capabilities/Tools*	Political pressure, special bureau for sustainability (human resources), metrics

6.5 GREEN CITY CLEAN WATERS

Green City Clean Waters is a policy program that is designed and implemented by the Philadelphia Water Department. The aim of this response is to deal with the combined sewage overflow. Combined sewage overflow occurs when excessive water in the combined sewage system (a combination of storm- and wastewater) goes untreated in the watershed system. In 1997, the US Environmental Protection Agency enforced the Clean Water Act (1972) and mandated the water department to update their long-term control plan for combined sewer overflow. The water department first looked at traditional grey infrastructure solutions such as sewer pipes. As the costs for the grey infrastructure (estimated at nine billion US dollars) were high, a group of people within the water department started to look at other alternatives such as green stormwater infrastructure (GSI). Examples of GSI are retention and detention ponds, permeable pavement, water crates, tree trenches and green roofs. GSI reduces the effects of urban heat islands, increases the soak-up of rainwater and results in climate change offsets (through carbon sinks) (PWD 2009). An alternative plan based on GSI would require a relatively smaller investment of two billion US dollars (Maimone 2013). In 2009, the water department presented Green City Clean Waters as their updated long-term control plan for combined sewage overflow.

Green City Clean Waters focuses specifically on addressing the future challenges for and pressures on Philadelphia's water system. These challenges vary from environmental (climate change) to social (urban regeneration) and financial (economic crisis) (PWD 2011). According to the water department, "[m]eeting these challenges requires either a significant new investment in infrastructure, or a paradigm shift in our approach to urban water resources" (PWD 2011). Green City Clean Waters aims to deal with 85 per cent of the calculated combined sewage overflow, but it is expected to also obtain economic and social benefits as well as environmental benefits (table 6.5). For example, the deputy commissioner argued that grey infrastructure will most likely be engineered by companies from abroad, which means that local investments flow out of the community; while GSI can provide green jobs for the community (Channel DE estuary 2011). Also, the mayor supports Green City Clean Waters as opposed to the grey infrastructure solution because of the plan's benefits: "We recognized we could save money, not dig up half of town, and improve our parks and green spaces" (Aston 2012).

Table 6.5 | Economic, social and environmental benefits of GSI

Economic	Social	Environmental
Property values	Recreation	Fishable, swimmable water
Job creation	Aesthetics	Habitat enhancement
City competitiveness	Public Health	Air quality
	Equity	Energy savings
		Carbon footprint

Source | Focht 2013

The water department is responsible for the design and the implementation of Green City Clean Waters and has approximately two billion US dollars to invest over a 25-year time period. The first five years are used as 'proof of concept'. This means that in this five-year period, pilot projects are set up to 'provide information for optimal design and program development' (PWD 2012, p. 3-2). The entrepreneurs leading the 'proof of concept' actions have initiated several learning processes on different fronts (communication, design and maintenance) in order to stimulate an organizational change. A consultant working for the water department said: "it is a complete learning process. Nobody has done this on this scale. The complexity [of the transition from grey infrastructure to GSI] was what everybody was afraid of. They feel that it is taking away of our core mission" (Interview PWD05). Some of the engineers working at the water department have been following routines for a very long time (Interview PWD 02). These routines will be subjected to change as the implementation of GSI continues: "We design with the equipment that we have today. But we also have to justify how to alter equipment and routines to make them more cost-effective" (Interview PWD 02). Furthermore, GSI requires the PWD to have employees with landscaping skills. Hence, employees are schooled in this, and new employees attracted (Interview PWD05, PWD08). The consultant emphasizes that mistakes are allowed during the 'proof of concept' period: "It is a change of course. It will not work out as we have envisioned it. We might not make the target in year ten and people get depressed about it [but they should not]. We are making a huge change" (Interview PWD08).

In order to implement the plan, the water department also needs to collaborate with other municipal departments, actors in the private sector and the community, as they are no longer putting the solutions underground, but above ground, making them visible and part of other policy domains. The water department has to convince these actors of the benefits of GSI. The water department already learned that other departments can be reluctant to collaborate: "they want to know, 'what is in it for us?'" (Interview PWD08). Although the water department is eager to implement its plan, its enthusiasm for action can be overwhelming for the other municipal departments. For example, in its contact with the department of Parks and Recreation, the water department sent different people of different levels to every meeting to advocate its plan. This proved intimidating and the water department had to pull back (Interview PWD08). The water department had to think of other ways to learn how to integrate GSI in the projects of other departments. For example, the water department placed water managers in other departments in order to learn about the routines of these departments (Interview PWD08, PWD02). However, this did not necessarily prove productive as one of the water managers "went native" – i.e. started working for the other department (Interview PWD08, PWD02). Overall, the water department noticed that in their collaborations with other departments, they needed to take up tasks that were not part of their job before. For example, they now also search

for additional monies so that they can realize the goals of other municipal departments in order to get them to collaborate. An illustrative example is the water department's funding application for playground equipment to collaborate with the department of Parks and Recreation (Interview PWD05).

Yet the actions of the water department have not been without success as approximately 400 projects have been completed or are on the way to being accomplished. These are programs in which the water department worked together with neighborhoods communities and school districts (see photo 6.1 and 6.2). They also continue to stimulate citizens to invest in GSI solutions by providing information and financial incentives. The stormwater billing initiative is such an incentive. With a change in billing structure from a charge based on a property's water meter size to charges based on the total size of the property and the amount of impervious area, the water department aims to stimulate property owners to apply GSI solutions. By implementing GSI, property owners can obtain credits that reduce their stormwater fee (Interview PWD04, PWD n.d.).

Photo 6.1 | Kensington High School manages all stormwater on site using green roofs, rain gardens and more (Focht 2013)

Photo 6.2 | Stormwater planters at Columbus Square Park maintained by the neighborhood community (PWD 2014)

Green City Clean Waters' stimuli | The stimuli that triggered the window of opportunity for Green City Clean Waters are regulations (Clean Water Act) together with financial limitations (the high costs for grey infrastructure). The Philadelphia Water Department was responsible for making a new plan to address the combined sewer overflow, but it was a group of entrepreneurs within the department who thought to act differently and started to advocate and lobby for another solution: GSI. The framing does not focus solely on climate adaptation, but also addresses other challenges in the city in order to gain support for implementation from other municipal departments and the public. In addition to applying their capabilities of advocacy and brokerage to gain support, the entrepreneurs also focused on knowledge exchange and had the financial resources to organize responses. Moreover, they showed perseverance as illustrated by the 12 year time gap between the Environment Protection Agency's mandate (1997) to the first Green City Clean Waters plan in 2009.

Table 6.6 | Stimuli for Green City Clean Waters

When	*Momentum*	Regulations, financial limitations
Who	*People*	Collective entrepreneurship within water department
Why	*Framing*	Societal, economic and environmental benefits
How	*Capabilities/ Tools*	Financial resources, networking through advocacy and brokerage, perseverance, flexibility

They continued to advocate their plan, but adjusted their approach each time a barrier emerged. This demonstrates flexibility. The response focuses on structural organizational change. To learn how to manage this change, the first five year period (proof of concept) focuses on pilot projects, stimulating learning processes and establishing a network.

Interestingly, an important stimulus for Green City Clean Waters was a regulation (Clean Water Act). Overall, regulations require conformance between goal and outcome, which is considered a characteristic of a dedicated approach (Uittenbroek et al. 2013, 2014). Yet the governance approach of Green City Clean Waters resembles a more mainstreaming approach as climate adaptation is part of the policy agenda of the water department and the main focus is on establishing performance within the existing organizational structures. The barrier of financial limitations was used by the institutional entrepreneurs as a stimulus to promote other practices and routines, and to seek synergies between climate adaptation and existing policy objectives inside and outside their policy department. For this, climate adaptation was strategically framed as a solution that results in possible social, economic and environmental benefits. The entrepreneurs use their networks and advocacy skills to establish pilot projects and learning processes. These projects and processes are allowed to fail as long as this leads to new insights, which is in line with performance.

6.6 DISCUSSION AND CONCLUSIONS

The aim of this chapter has been twofold: first, to provide insight into what stimuli have activated climate adaptation responses and second, whether these stimuli influence the governance approach to climate adaptation. In the Philadelphia case, which was conducted in order to refine our initial conceptual framework and illustrate the working of stimuli, several stimuli were identified: political leadership, elections (as window of opportunity), institutional entrepreneurship, strategic framing (by stressing multiple benefits of climate adaptation) and several capabilities and tools such as advocacy, perseverance, flexibility and metrics. To an extent, these findings support the previous work of researchers who have argued the relevance of similar stimuli before; see for example Wejs et al. (2013) on the key role for institutional entrepreneurs and Bulkeley and Betsill (2013) on the framing of climate change within wider urban agendas. These researchers highlight important stimuli for climate adaptation, but independently these stimuli might not be sufficient for organizing a

response. The Philadelphia case illustrates that climate adaptation responses are not organized in a vacuum. One institutional entrepreneur will not hold all capabilities or tools necessary to organize a climate adaptation response and a political leader might not be triggered to act upon climate adaptation without elections. The organization of responses to climate adaptation is a process in which several stimuli bring the process forward (or barriers hold the process back).

In addition to this, the Philadelphia case shows that to some extent the combination of stimuli influences the governance approach. Moreover the case shows that the two programs have been triggered by different (combinations of) stimuli which resulted in two different governance approaches on different levels in the municipality (see table 6.7). The combination of stimuli of elections, societal pressure, political leadership and power resulted in the instalment of a special office by the mayor and the use of metrics to force policy departments to act upon climate change. It initiated a top-down and overall dedicated approach. The other combination of stimuli consisting of regulations in combination with limited resources (i.e. a barrier being a stimuli at the same time), collective entrepreneurship, networking and advocacy resulted in program that focused on changing established routines (from grey infrastructure to green stormwater infrastructure) within policy departments. Through pilot projects, learning and legitimacy building for new routines is initiated. The focus is on improving performance concerning climate adaptation through changing existing structures which is in line with the mainstreaming approach.

Although these are generally presented as two distinct governance approaches, the stimuli identified in the Philadelphia case have led to a governance approach in which the dedicated and mainstreaming approaches co-exist. To some extent, the two approaches even influence each other: the mayor's dedicated program influences the mainstreaming of the water department as the department's responses have to comply with the mayor's metrics. Some researchers have argued earlier that both governance approaches need to be present for the organization of climate adaptation responses (Bulkeley 2010, Carmin et al. 2012). A dedicated approach is necessary to allocate new resources and provide political pressure to speed up responses, while the mainstreaming approach focuses on combining objectives within and between policy departments (legitimacy building) and on developing learning processes

Table 6.7 | Differences between the two adaptation programs in the Philadelphia case

	Greenworks	**Green City Clean Waters**
Initiator within municipal organization	Mayor (political agenda)	Policy department (policy agenda)
Stimuli	i.a. elections, societal pressure, political leadership and power, metrics	i.a. regulations, collective entrepreneurship, networking, advocacy
Governance approach	Dedicated approach	Mainstreaming approach

in order to structurally change routines. The Philadelphia case illustrates that this is possible, but further (longitudinal) research is necessary to explore how these approaches interact. For each approach, the aim is to organize climate adaptation responses, but these responses might not be the same as one focuses on political profiling and the other on a change in routines. Yet as the governance approaches seem to occur on different levels in the municipal organization, they could also be each other's stimulus to organize climate adaptation responses.

We are aware that our research is based on just one case study and that this is not sufficient for generalization regarding stimuli or governance approaches. Nonetheless, the Philadelphia case provides new insights regarding stimuli and their influence on governance approaches as the stimuli have been identified in a larger context and not just presented as independent stimuli. We encourage other researchers to do this also in other cases as this assists in refining our understanding of possible stimuli for climate adaptation in cities. This could benefit cities in recognizing stimuli within their own (policy) context and subsequently, assist in the exploitation of all or some of these stimuli to initiate a governance approach to climate adaptation.

CHAPTER 7 | Epilogue

Cities worldwide are faced with the challenge of adapting to climate change, as associated risks such as flooding and heat stress can disturb daily urban systems and services (IPCC 2014, Castán Broto and Bulkeley 2013, While and Whitehead 2013, Hunt and Watkiss 2011, Satterthwaite et al. 2009). This PhD dissertation addresses the governance of climate adaptation in cities.

Several researchers have advocated 'mainstreaming' as a possible governance approach to address climate adaptation (Bulkeley 2010, Kok and De Coninck 2007, Klein et al. 2007, Smit and Wandel 2006, Schipper and Pelling 2006, Bouwer and Aerts 2006). Mainstreaming refers to the integration of climate adaptation into existing policy domains. This approach is expected to result in more effective and efficient policymaking than a dedicated approach (i.e. climate adaptation as a new policy domain), because it aims at establishing synergies between policy objectives and resources, increases policy coherence and reduces possible duplications in policies (Rauken et al. 2014, Kok and De Coninck 2007). However, in literature, there is no conceptual clarity regarding mainstreaming and in practice, it is only observed incidentally. Since there is no unequivocal understanding of the concept, it is difficult to analyze whether mainstreaming is producing these benefits, and if mainstreaming contributes to the climate-proofing of cities. The aim of this dissertation is to develop an in-depth understanding of mainstreaming in relation to climate adaptation and urban policy. This is done in four stages. The first stage entails the characterization of mainstreaming by contrasting it with a dedicated approach to climate adaptation in particular. In the second stage, possible barriers and opportunities for mainstreaming are explored. Subsequently, in stage three, strategies to promote mainstreaming are identified. Finally, in stage 4, criteria to evaluate mainstreaming in practice are established.

This epilogue functions as the concluding chapter that summarizes and reflects upon the main findings presented in the dissertation. The chapter unfolds as follows: (I) a discussion of these findings, (II) reflections on the research approach and case selection, (III) recommendations for future research, (IV) knowledge valorization: from research to practice, and (V) some final thoughts.

7.1 DISCUSSION OF THE MAIN FINDINGS

The previous chapters have provided valuable insights that assist in the development of a better understanding of mainstreaming climate adaptation in urban policy. In this section, the findings of these chapters are used to answer the four research questions presented in Chapter 1. The questions posed in the chapters do not entirely coincide with the main research questions. The latter are formulated on a more abstract level. In the next paragraphs, the chapter will explicitly address the main research questions, drawing on the empirical

findings presented in the respective chapters. This section concludes with a reflection on the aim of this dissertation.

7.1.1 RQ1 | How can the mainstreaming of climate adaptation be conceptualized?

In the dissertation, two elements have been pertinent to the conceptualization of mainstreaming: (I) the conceptual model presented in Chapter 2 and, (II) the distinction between the mainstreaming approach and the dedicated approach. Mainstreaming as a process | The conceptual model formed the initial understanding for mainstreaming (see Chapter 1; Figure 1.2 for the primary conceptual model). This model conceptualized mainstreaming as a process where climate adaptation objectives are to be integrated in policy processes. The aim of climate adaptation is to make the cities or particular urban systems and services climate-proof. In the mainstreaming process, climate adaptation is one of the policy objectives, as opposed to being the main objective. This means that synergies need to be established between climate adaptation objectives and the other policy objectives in the policy process. Otherwise, climate adaptation objectives have to compete with these other policy objectives. The desirability and feasibility of climate adaptation will be constantly reconsidered in relation to the other objectives included in the policy process (as found in Chapter 6). The presence of multiple objectives in the process can lead to barriers to and opportunities for mainstreaming. In the model, possible barriers and opportunities are distinguished and assigned to different phases in the policy process (understanding, planning and management); more attention is given to barriers and opportunities in the next paragraph. As a result of these influences, the extent of mainstreaming can vary throughout the policy process. This gives the mainstreaming process a dynamic character. A 'fully' climate-proof outcome is difficult to achieve or not preferable when it goes at the expense of the other policy objectives. This means that sometimes trade-offs between policy objectives need to be made. Therefore, at least theoretically, mainstreaming processes should be evaluated based on performance (i.e. a deliberate assessment of an objective in relation to the given context) and not on conformance (i.e. concurrence between outcome and objectives) (see also paragraph 7.1.4).

Mainstreaming vs. a dedicated approach to climate adaptation | Additionally, by contrasting the mainstreaming approach to the dedicated approach, a framework was created that assisted in distinguishing the characteristics of the two approaches. This distinction between the two governance approaches has been rather black and white, but in this way useful as it provided the nuances that were needed to define the mainstreaming approach further. An initial list of characteristics is extracted from the model presented in Chapter 2 (see table 7.1). By applying this framework also in other chapters, it was possible to expand this list (see table 7.2). The added characteristics are briefly discussed.

Table 7.1 | Initial list of characteristics

	Dedicated approach	**Mainstreaming approach**
Objective	Adaptation as main objective	Adaptation as one of the objectives
Policy process	Linear	Dynamic
Criterion for evaluation	Conformance	Performance

Source | Chapter 2

First, in case of mainstreaming, climate adaptation is framed in such a way that it is considered an added value to other policy objectives in the process (Chapter 4 and 6). In doing so, climate adaptation can 'piggyback' on the established political commitment of policy domains in which it is integrated – as illustrated in the Amsterdam case (Chapter 4). This implies that mainstreaming can be based on indirect political commitment and that direct political commitment to climate adaptation is not necessarily required, as opposed to what several researchers have argued (see e.g. McCarney et al. 2011, Carmin et al. 2009, Smith et al. 2009). However, indirect political commitment means that there is no political agenda-setting of climate adaptation, allocated resources or endorsement of specific adaptation policies. This means that in the case of mainstreaming, climate adaptation is most likely part of the agenda of the policy department that aims to address climate adaptation (Chapter 4 and 6); and that this policy department searches for synergies between climate adaptation and existing policy objectives and by doing so, intends to address climate adaptation within the existing organizational structures (i.e. existing human and financial resources in the policy department) (Chapter 4, 5 and 6). This requires that the mainstreaming of climate adaptation is considered legitimate in relation to other policy objectives (Chapter 5). This is however not evident, which leads to an erratic implementation of climate adaptation responses.

Reflection | However, as black and white as the dedicated and mainstreaming approaches have been presented in this dissertation, the findings illustrate that this distinction is analytical. In practice, this distinction is less clear – see for example Rotterdam in Chapter 4 or Philadelphia in Chapter 6. These cases

Table 7.2 | Expanded list of characteristics

	Dedicated approach	**Mainstreaming approach**
Objective	Adaptation as main objective	Adaptation as one of the objectives
Policy process	Linear	Dynamic
Criterion for evaluation	Conformance	Performance
Framing of adaptation	Main objective (explicit)	Added value (implicit)
Political commitment	Direct	Indirect
Agenda-setting arena	Political arena	Policy department arena
Resources	New assigned resources supported by new organizational structures	Reallocating resources within existing organizational structures
Policy design	Specific policy	Synergies in policy objectives
Implementation	Fast	Erratic

Source | Chapter 2, 4 and 6

illustrate that the two governance approaches can co-exist, complement and/or alternate with each other. Some other researchers have already argued that possibly both approaches are relevant and necessary to organize climate adaptation (see e.g. Bulkeley 2010, Carmin et al. 2012). The dedicated approach provides the commitment and resources to establish awareness and urgency for climate adaptation, while the mainstreaming approach focuses on stimulating a change in the existing structures of policy domains to include climate adaptation in their policy processes (from urgency to action). That both approaches can reinforce each other is also illustrated in the water retention road case in Amsterdam (Chapter 5) and the water plaza case in Rotterdam (Chapter 4). In the Amsterdam case, additional resources and commitment were necessary to bend the existing structures. However, the Rotterdam case illustrated that additional resources and political commitment were not enough to implement and maintain a water plaza. A deliberate assessment (in terms of a public participation process) was necessary to obtain legitimacy for the implementation of the climate adaptation measure.

7.1.2 RQ2 | What are the barriers to and opportunities for mainstreaming and to what extent can these be linked to different phases of a policy process?

An initial understanding of possible barriers and opportunities was included in the conceptual model that was presented in Chapter 2. Based on a categorization inspired by Adger et al. (2007) and Moser and Ekstrom's (2010) analytical framework for the adaptation process, five types of barriers and opportunities (social, cognitive, financial, technical, and organizational/institutional) are linked to different phases of the policy process (see again figure 1.2). Empirical evidence of the presence of these types of barriers and opportunities were found in the case studies discussed in Chapter 3 to 6. Most prominent in the research are barriers and opportunities that related to the variation in cognitive understandings, organizational structures (i.e. the organization's values and routines), institutional support in terms of political commitment, and the amount of (financial) resources.

Organizational structures | Chapter 3 illustrates how organizational values – i.e. a socially shared cognitive representation of problem definition and strategy – varied between three municipalities (Amsterdam, The Hague and Rotterdam) and also between policy departments within the same municipality. Although in all three municipalities there was a common understanding of the problem, impacts and solutions concerning climate adaptation, there was disagreement on the allocation of responsibilities and time of action. In other words, there is knowledge of the overall complexity of the issue, but limited knowledge of how to address the uncertainties and ambiguities of climate change (Amundsen et al. 2010, Biesbroek et al. 2009b, Adger and Vincent 2005). This complicates the coordination of who should act and when. Moreover, these values are often linked to organizational routines that provide rules for coordination and

interaction between actors, and changing these proves challenging, as demonstrated in the water retention road case (Chapter 5).

Institutional support | Institutional support in terms of political commitment is considered an important trigger for climate adaptation (McCarney et al. 2011, Carmin et al. 2009, Smith et al. 2009). Also in Chapter 3, the need for political commitment to climate adaptation is stressed, which is accordingly discussed based on the Amsterdam and Rotterdam cases in Chapter 4. Political commitment can influence organizational values and routines by providing attention and (financial and human) resources to climate adaptation. However, as argued earlier, direct political commitment is not necessarily required for the mainstreaming of climate adaptation. By establishing networks and building legitimacy for climate adaptation within a policy department, an opportunity for mainstreaming arises without political commitment.

Resources | The amount of human and financial resources available to climate adaptation (whether it is to develop knowledge or implement technical measures) is another example of the barriers and opportunities that frequently resurfaces throughout the research (Biesbroek et al. 2011, Moser and Ekstrom 2010, Crabbé and Robin 2006). This is also found in the empirical cases - see for example Chapters 3 to 6. The reallocation of resources to climate adaptation within the existing organizational structures remains challenging. Additional resources can assist in initiating learning processes in order to learn how to mainstream climate adaptation (Chapter 5 and 6).

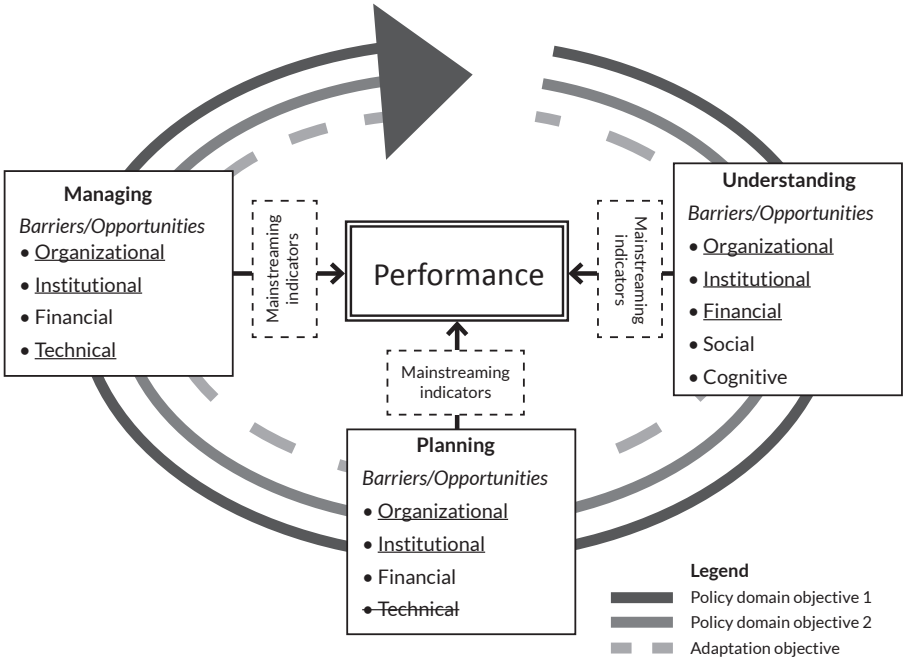
Subordinate role | The other two types of barriers and opportunities (social and technical) were found to have a subordinate role in the empirical cases. This is not to imply that these barriers and opportunities cannot influence mainstreaming, but that they were less visible throughout the cases. Social barriers or opportunities in terms of different world views were not clearly detected in the cases; overall, all cities aim to be sustainable and resilient. Furthermore, Chapters 4, 5 and 6 illustrate that climate adaptation might require other technical measures, but that it is not necessarily the technical aspect that forms the barriers and opportunities, but rather whether there is support for the solution in the municipal organization and in society (cf. Pyke et al. 2007).

Reflection | Some of these barriers and opportunities can be linked to different phases of a policy process. For example, social and cognitive barriers and opportunities occur at the beginning of the policy process in the understanding phase, and technical barriers and opportunities occur during the implementation and managing phase (Moser and Ekstrom 2010). However, organizational, institutional and financial barriers and opportunities can occur during any phase of the policy process. The main reason for this is that there is competition from other policy objectives whether in- or outside the mainstreaming process (Pasquini et al. 2013, Biesbroek et al. 2009a). This means that political commitment is

easily lost to other issues on the agenda (Chapter 4), existing organizational values and routines can be rigid as they focus on specific outcomes (Chapter 3 and 5) and financial resources are limited and already allocated (Chapter 3, 5 and 6). Hence, in case of mainstreaming, there is a constant need to establish and sustain the urgency for climate adaptation.

Based on this, some changes are suggested regarding the initial conceptual model (see figure 7.1). A first suggestion is to separate organizational and institutional barriers and opportunities because they may relate to each other, but as demonstrated in this dissertation each has a distinctive influence on mainstreaming. A second proposition is to add financial barriers and opportunities to the understanding phase, since access to knowledge and knowledge development also require resources. Thirdly, the suggestion is to move the technical barriers and opportunities in the conceptual model, to the last phase of the policy process because these tend to surface in the implementation and managing phase rather than the planning phase.

Figure 7.1 | Refined conceptual model*



*Suggestions for added barriers/opportunities in bold and underlined; removed barriers/opportunities in strikethrough

7.1.3 RQ3 | Which deliberate strategies can promote climate adaptation in cities?

Much attention is given to the identification and understanding of barriers to climate adaptation (see e.g. Biesbroek 2014, Runhaar et al. 2012, Amundsen et al. 2010). In doing so, the role of opportunities (or stimuli) is largely ignored. By exploiting certain opportunities, municipalities could avoid or overcome barriers to climate adaptation. Some of these opportunities are induced by external factors (i.e. windows of opportunity), while others might be created by the municipal organization. The latter are considered deliberate strategies that can possibly also be exploited by other cities. Based on the findings of Chapters 3 to 6, four deliberate strategies can be identified: framing, political leadership, institutional entrepreneurs and learning.

Framing | The framing of an issue can have enormous consequences for how an issue is threatened in political and policy processes (Bulkeley and Betsill 2013, Fünfgeld and McEnvoy 2011, Pralle 2009). It is considered a tool and could be deliberately used to gain political commitment (whether direct or indirect). As demonstrated in the Rotterdam, Amsterdam and Philadelphia cases, climate adaptation is framed in relation to (water) safety, sustainability and livability (Chapter 3, 4, 6). By using concepts and terms closely related to the current framings in a policy domain, it is possible to signify the relevance of climate adaptation for that domain, and increase the understanding of, and support to act upon climate adaptation (Chapter 3).

Political leadership | Several researchers have stressed the importance of political leadership for climate adaptation (e.g. Carmin et al. 2012, Measham et al. 2011, Smith et al. 2009). It is important that politicians present a clear vision on climate change and thereby adaptation. In both the Rotterdam and Philadelphia case, local politicians have taken the lead in addressing climate adaptation (Chapter 4 and 6). Although the findings show that this might result in fast and visible actions which are not necessarily effective to the goal of climate adaptation but more to increase the politician's profile; awareness and urgency is created for the issue within the municipal organization (as policymakers have to design and implement the actions) but also in society (due to the visibility of the actions).

Institutional entrepreneurs | Institutional entrepreneurship can also be seen as a deliberate strategy for climate adaptation as suggested by the findings of this dissertation as well as other researchers (Wejs et al. 2013, Carmin et al. 2012, Bulkeley 2010, Kingdon 2002). Institutional entrepreneurs use their network skills to mobilize actors and resources, and promote alternative solutions. They focus on building legitimacy in order to get (institutional) support for climate adaptation (Chapter 4, 5 and 6). These entrepreneurs can be situated within or outside the municipal organization. In the Amsterdam and Philadelphia cases, the institutional entrepreneurs resided mainly in the water department. This

policy domain is seriously affected by climate change and is searching for space to storage the excessive water that is expected due to an increase in (extreme) precipitation events. This requires the water department to innovate their organizational routines and think of solutions that could involve other policy domains (Chapter 5 and 6). But the Next Great City movement in Philadelphia is an example of a collective of institutional entrepreneurs that acted from outside the municipality. Their objective was to stimulate the municipality to invest in the sustainability and livability of the city (Chapter 6).

Learning processes | Several researchers have pointed out that there is a need to revise and rethink current organizational routines, but that there are many missed opportunities when it comes to knowledge exchange and learning (Storbjörk 2010, Pelling et al. 2008, Wilson 2006). The Amsterdam and Philadelphia cases both illustrated how pilot projects assist in developing shared preferences about how to address climate adaptation, but it also revealed possible barriers and opportunities for actors involved in the process. In other words, learning processes can provide insight into the coordination and interaction between actors as well as an opportunity to explore how to effectively and efficiently change the routines (Chapter 5 and 6).

Reflection | As discussed in Chapter 6 some of these strategies are more likely to initiate a dedicated approach (e.g. political leadership), while others might activate a mainstreaming approach (e.g. learning processes). But independently these strategies might not be sufficient to organize climate adaptation responses. The Philadelphia case suggests that it is rather a combination of stimuli that influences the governance approach (Chapter 6). Besides deliberate strategies, this combination of stimuli will also include windows of opportunity. Exploiting such windows of opportunities could initiate other governance approaches.

7.1.4 RQ4 | How can the mainstreaming of climate adaptation in urban practice be evaluated?

In this PhD dissertation, two sets of evaluation criteria have been advanced: I) indicators for assessing the extent of mainstreaming during a policy process and II) performance for evaluating the outcomes of mainstreaming processes. Both are also included in the conceptual model (see figure 7.1).

Evaluating the extent of mainstreaming | The first set of criteria is based on four indicators introduced by Kivimaa and Mickwitz (2006) to analyze Environmental Policy Integration (EPI). EPI focuses on the inclusion of environmental objectives in existing policy domains (Runhaar et al. 2014, Jordan and Lenschow 2010, Lafferty and Hovden 2003). As discussed in Chapter 2, mainstreaming is considered a specific form of EPI. The extent of mainstreaming in a policy process is measured by means of inclusion, consistency, weighting and reporting (ex ante and ex post) (see table 7.3 for an operationalization). Inclusion is

Table 7.3 | Operationalization of mainstreaming indicators

Indicator	Operationalization
Inclusion	The issue (i.e. climate adaptation) is included by referring to the issue and the related risks
Consistency	A shared understanding of the issue concerning impact and measures (among actors and in policy documents)
Weighting	Priority is given to the issue in relation to the other objectives involved
Reporting	*Ex ante*: specifications and strategies for the distribution of responsibilities and the allocation of resources *Ex post*: evaluation in the form of feedback that could stimulate learning

Source | Chapter 2

considered necessary for the other three indicators to exist (Kivimaa and Mickwitz 2006). For researchers, the mainstreaming indicators are useful in order to identify whether or not and to what extent climate adaptation has been mainstreamed in a policy process. For practitioners, the indicators are useful as stepping stones to assess the extent of mainstreaming in the policy process.

Evaluating the outcomes | The outcomes of mainstreaming are evaluated in relation to the set objectives (cf. Rossi et al. 2004). As stated earlier this can be done in two ways, namely based on conformance or performance (Faludi 2000, Mastop and Faludi 1997). In case of mainstreaming, climate adaptation is assessed in relation to the other objectives and the context in order to learn if it is actually an added value to the outcome. The value of mainstreaming climate adaptation is deliberately assessed and only included in the outcome if considered effective and efficient. This is different from setting an objective and implementing it without consideration (i.e. conformance). The 'greened acre metric' in the Philadelphia case suggested that the latter can be ineffective (Chapter 6). There might be more effective solutions to climate adaptation but these are not allowed as they are not in concurrence with the set objective.

For performance, a further distinction of three stages is possible: acquaintance, consideration and consent (see table 7.4 for an operationalization) (van Doren et al. 2013). These stages can be used to assess if the performance increases after multiple mainstreaming processes. The water retention case (Chapter 5) demonstrates that actors might not succeed in addressing climate adaptation immediately, but that in spite of this, the performance increases after several mainstreaming processes as actors become acquainted with the issue, consider the need for the issue, and accordingly consent to address the issue. This also illustrates a learning process. Based on the findings, evaluating the effectiveness

Table 7.4 | Operationalization of performance

Evaluation on	Stages	Operationalization
Performance	*Acquaintance*	The understanding of the issue
	Consideration	The desirability of the issue
	Consent	The feasibility of the issue

of mainstreaming based on performance is considered valid, because as the Amsterdam and Philadelphia cases (Chapter 5 and 6) demonstrate, addressing climate adaptation in urban policy involves a change in values and routines. To do this effectively, it requires time and scope for trail-and-error.

Reflection | While both sets of indicators are relevant in assessing the mainstreaming of climate adaptation, it is the evaluation based on performance that is interesting. Thus far, performance has been mainly discussed in a positivistic perspective[31] opposed to a normative perspective. That is, if climate adaptation is not mainstreamed in this policy process or outcome, lessons are still learned and this will assist the next attempt at mainstreaming climate adaptation (see for example the water retention road case in Chapter 5). Performance-based evaluation could suggest that there are no consequences for the exclusion of climate adaptation as long as it has been deliberately excluded from the process and lessons are learned for the next mainstreaming process. Yet if climate change is real and climate adaptation is urgent then there are of course consequences (e.g. economic damage to urban systems and health problems). These consequences might not be (fully) experienced today, but they will be in the future (EC 2013, IPCC 2014). Based on this reasoning, a more normative perspective would be expected regarding the mainstreaming of climate adaptation.

7.1.5 A reflection on the aim of this dissertation

The aim of this dissertation was to develop a better understanding of mainstreaming in relation to climate adaptation and urban policy, because an unequivocal understanding is currently lacking in literature. While the discussion above already assisted in this, some additional observations need to be made that do not necessarily fit the scope of the research questions but relate to the aim of this dissertation.

First of all, it should be stressed that (the mainstreaming of) climate adaptation is a relatively new issue in literature and in practice. Only few cities have established policy for it (Reckien et al. 2014). This is not so much a limitation for research as it is the current reality of the mainstreaming of climate adaptation in practice. The theoretical development of the mainstreaming concept is occurring simultaneously with the practical implementation. Hence, the expectation is that the mainstreaming of climate adaptation will continue to evolve in its conceptual and practical understanding.

This is also visible in this dissertation, as mainstreaming was in the beginning understood as an approach to *conveniently* link climate adaptation to other policy

[31]Positivism is a philosophy in which theoretical learning and knowledge development is based on observations from practice. The established knowledge is accordingly used to influence the evolution of social change and aims to improve the human condition. The need for norms and ethics is disregarded. The possible downside of positivism is that there is 'no wrong doing' since any wrong can be solved by science and technology at a later stage.

objectives, pursuing windows of opportunity whenever climate adaptation can be considered an *added value*. This results in incidental actions. Examples of this are the case studies of Schieveste (Chapter 2) and to some extent also the water retention road in Amsterdam (Chapter 5). However, as widely debated in literature, climate change is ongoing (IPCC 2014, 2012, WMO 2013). Adapting to climate change becomes more relevant as global mitigation efforts are not sufficient to stop the climate from changing (Reckien et al. 2014, Bedsworth and Hanak 2010, Davoudi et al. 2009). While climate adaptation is expected to be urgent, it is not realistic to assume that institutional support (in terms of political commitment or public pressure) for the issue is always going to be explicit. There are other (social, economic, environmental) issues that also ask for attention. Downs (1972) already explained this with his 'issue attention cycle'; awareness for an issue always fades away as other more urgent issues surface. This has been argued also by other researchers who studied the agenda-setting process (e.g. Kingdon 2002, Rochefort and Cobb 1994, Baumgartner and Jones 1993). Political commitment might be gained temporarily and assist in supporting mainstreaming, but this might not be sufficient for changing the erratic outcomes of mainstreaming.

Moreover, a city will not become climate-proof because of some incidental mainstreaming processes that do result in the implementation of climate adaptation measures. To address climate adaptation, mainstreaming needs to become *mainstream*; implying that mainstreaming should be understood as an approach to *structurally* and *deliberately* integrate climate adaptation into urban policy. This requires the municipal organization to change organizational values and routines in various policy domains. The Philadelphia case (Chapter 6) illustrates that this is a long-term process. Routines can be rigid and therefore difficult to change. The new routines need to be considered legitimate in terms of being efficient and effective. If municipalities choose not to change and carry on with exploiting windows of opportunity, the mainstreaming of climate adaptation will most likely continue to encounter organizational barriers. That is, organizational values in which the urgency for climate adaptation is limited and routines that do not accept (or even consider) the issue. Based on this, it can be concluded that organizational change is necessary in the case of mainstreaming. This change needs to be considered legitimate (i.e. effective and efficient) by actors involved in the planning and managing phases of the policy process. Deliberate strategies such as institutional entrepreneurs and learning processes can assist in building this legitimacy (Chapter 5 and 6, but also argued by Bulkeley and Betsill 2013, Wejs et al. 2013).

Finally, the focus of this dissertation has been explicitly on the municipal organization. In practice, climate adaptation is often addressed by governments (Mees and Driessen 2011, Wilson and Termeer 2011, Storbjörk 2010). However, the municipality should not be the only one responsible for climate adaptation (e.g. Mees et al. 2013, 2012, Tompkins et al. 2012, Agrawala & Fankhauser 2007,

Füssel 2007). Municipalities can consider how they involve private actors (citizens, businesses and organizations) when mainstreaming climate adaptation; see for example, the Philadelphia case and their interaction with neighborhood communities and school districts (Chapter 6). Yet on the other hand, these private actors can take responsibility for climate adaptation and explore the mainstreaming of climate adaptation in their own values and routines.

7.2 REFLECTIONS ON THE RESEARCH APROACH AND CASE SELECTION

The research has used multiple perspectives (such as governance, planning, political and organizational science) and applied several analytical frameworks to develop a better understanding of mainstreaming. In general, the combination of multiple perspectives as input for the analytical frameworks has resulted in more in-depth insights for adaptation governance literature. The application of these frameworks in empirical cases has been beneficial for the refinement of mainstreaming as a concept.

The case selection provided the empirical findings for the theoretical development of the mainstreaming concept since the cities selected have all started to adapt to climate change. However, the selection includes mainly Dutch cities. One could question to what extent the Dutch context is similar to cities in other countries, as the resources, authority and networks to address climate adaptation will vary (Hunt and Watkiss 2011). For this reason, the Philadelphia case (Chapter 6) was added to the research. Although the design of policies and decision-making in this city deals with another institutional context, the case study research demonstrated similar patterns regarding the governance of climate adaptation as those identified in the Dutch context. It will be interesting to explore this further and discover if similar patterns can be found other cities and countries as well.

Additionally, it needs to be addressed that the case selection includes primarily large cities. Amsterdam, Rotterdam and The Hague are the largest cities in The Netherlands and Philadelphia is the fifth largest in the United States[32]. Smaller cities might encounter other barriers to and opportunities for mainstreaming. For example, smaller cities will have (even) less financial resources to spend on climate adaptation. Or, whereas in large cities there are departments for various policy domains, in smaller cities one person is most likely responsible for several policy domains. It has been argued that policymakers in smaller cities are often more pragmatic than progressive (van den Berg and Coenen 2012). They might not have or take the time to explore a new issue as climate adaptation. On the other hand, mainstreaming might be the pragmatic approach that they are looking for when they do want to adapt to climate change.

[32]It is understood that the area size and population of Philadelphia are different to those of the Dutch cities.

As stated before, the mainstreaming of climate adaptation is a relatively new issue. This also implies that the theoretical development of the mainstreaming concept is occurring simultaneously with the practical implementation. The evaluation of mainstreaming in cities has therefore been difficult; certainly, if the concept is understood as the structural integration of climate adaptation in existing policy domains. In order to assess whether mainstreaming will change in nature and whether it contributes to the climate-proofing of cities, follow-up research is required that considers a longer time span (at least longer than ten years). Otherwise it will not be possible to indicate if the changes are structural. However, few cities have established policy for climate adaptation; and fewer have a policy that has been in place longer than a decade (Reckien et al. 2014). Hence, much is still to be discovered about mainstreaming. This research has taken mainstreaming out of its infancy and in the direction of adolescence, but further research is instrumental for a mature understanding. The next section provides recommendations for this.

7.3 RECOMMENDATIONS FOR FUTURE RESEARCH

The findings of this dissertation have provided new insights for conceptual and practical understanding of mainstreaming climate adaptation as well as leading to new questions and topics for future research.

A first recommendation concerns further exploration of the relation between the two governance approaches: the dedicated approach and the mainstreaming approach. The conceptual understanding of the two approaches (as presented in Chapter 2 and Chapter 4) provide a foundation to establish whether these approaches are also identifiable in other cities. Applying this understanding in cities in other countries is also valuable for gaining more insight into contextual factors that might be influential, such as existing experience with climate impacts and national policy. Accordingly, the relation between the two approaches requires exploration in order to establish whether a hybrid form of the two approaches should be advocated. This has been argued by other researchers (Bulkeley 2010, Carmin et al. 2012). Based on the findings of Chapter 6, it is possible that the two approaches can co-exist within the same city. More research is necessary to gain insight into how the two approaches interact and the extent to which the two approaches support each other in organizing climate adaptation. Exploring the relation between the two approaches could result in the identification of possible other governance approaches that policymakers can use to adapt to climate change.

A second recommendation is to extend the work on the evaluation of mainstreaming. The integration of climate adaptation in existing policy domains has been presented as an approach that encourages effective and efficient policymaking (Kok and De Conick 2007, Klein et al. 2007, Schipper and Pelling, 2006), but there has been a lack of research that endorses this statement.

This dissertation has contributed to the theoretical development of the mainstreaming concept, but did not specifically produce empirical findings that indicate mainstreaming climate adaptation does indeed lead to more effective and efficient policymaking. For this, it is necessary to also point in the direction of the literature on Environmental Policy Integration (EPI). Several researchers have indicated that in practice, the promises of EPI (i.e. efficiency, the realization of mutual benefits and more) have not been fulfilled (Runhaar et al. 2014, Adelle and Russel 2013, Nilsson et al. 2009). Since mainstreaming is considered a special form of EPI, this observation is most likely also applicable for mainstreaming. If this is the case, further research should focus on identifying and/or developing more effective strategies for mainstreaming. For this, an ally can be found in EPI literature (see Runhaar et al. 2014).

A final recommendation is to stop producing lists of barriers to and opportunities for (the mainstreaming of) climate adaptation. These lists are only valuable to a certain extent as researchers (and policymakers) can identify whether or not these barriers and opportunities have been experienced or can be expected. Yet these lists do not provide an in-depth understanding of how and why these barriers and opportunities occur or how they can be overcome or seized. Without such understanding, policymakers are not able to anticipate and exploit the barriers and opportunities. An explanation for the occurrence of these barriers and opportunities can be possibly found in other bodies of literature. For example, in Chapter 5, this dissertation ventured into the literature of public policy and organizational management, and this has resulted in some useful insights. Moreover, these other bodies of literature might even include strategies to avoid or overcome these barriers and to seize the opportunities. Further interdisciplinary research will benefit the existing literature on governance and climate adaptation.

7.4 KNOWLEDGE VALORIZATION: FROM RESEARCH TO PRACTICE

7.4.1 Observations from the Climate Proof Cities consortium

This research has been carried out within the Dutch research program Knowledge for Climate (See Appendix A). The aim of this program is knowledge valorization: the application of scientific knowledge in practice. The construction of the program – that is, researchers together with stakeholders (governments and businesses) develop knowledge, tools and services that can assist in making The Netherlands climate-proof – intends to support this aim. While there are benefits to this construction (for the researchers, the immediate access to stakeholders and their network, and for stakeholders, insight into the newest research findings), there are also some issues to be aware of (also see Janssen-Jansen and Tan 2014). This applies to both researchers and stakeholders participating in this and similar programs. The main issue that requires attention is that of possible bias as a result of such a construction. This is

illustrated with a personal observation from the Climate Proof Cities consortium (Theme 4).

At the beginning of the research project, the interest of the stakeholders in the research on governance was only limited. This lack of interest was based on the logic that if there is a technical solution, the planning and implementation was 'easy'. After governance researchers pointed out possible barriers, and stakeholders had tried to implement some technical solutions without success, their interest in the governance research grew. The stakeholders became aware that climate adaptation is also an issue of governance. In relation to this dissertation, this meant that mainstreaming got much attention from the stakeholders. After a presentation on my early research findings based on a literature review in which mainstreaming was understood as an approach that would lead to more effective and efficient policymaking, the stakeholders started using the term 'mainstreaming' actively. The findings got simplified to: mainstreaming is 'right' and dedicated is 'not'; probably because the findings that were presented about mainstreaming best suited the solution that they preferred (cf. Janssen-Jansen and Tan 2014). However, my research did not assess whether mainstreaming leads to more effective or efficient policymaking.

This observation illustrates that bias can be easily developed during the knowledge exchange between researchers and stakeholders. Bias can lead to hollow concepts, see for example the current applications of the concepts 'sustainability' and 'resilience'. It is important for both parties to be aware of this. Stakeholders should remain critical of early research findings and not adopt them partially. Researchers, on the other hand, are responsible for how they present their findings and should remember that findings, although presented in an objective way, can still be interpreted otherwise.

7.4.2 Implications for policy practice

After having said the above, this section will provide two insights from this dissertation that are valuable for policy practice. The first insight addresses the possible bias that has been created concerning the distinction between the two approaches. Municipalities can reflect on the two approaches and opt to apply deliberate strategies to initiate a certain governance approach, but they should not commit to one. As demonstrated in this dissertation, both the mainstreaming and dedicated approaches have their positive and negative characteristics, and it is quite possible that the application of both approaches could be reinforcing. The dedicated approach can provide the commitment and resources to establish a quick awareness and urgency for climate adaptation in the municipal organization and society, while the mainstreaming approach can stimulate a structural integration that secures the urgency for climate adaptation into organizational values and routines. Together the approaches can bring the climate-proofing of cities forward.

The second insight relates to the urgency for climate adaptation. Urgency for an issue is not easily established without a problem. The awareness for an issue always fades away as other more urgent issues surface. This also applies to climate adaptation. Even during the four year time period in which this dissertation has been written, the awareness for climate adaptation has faded in-and-out. Looking at the Dutch context, it could be questioned if this awareness has ever turned into urgency. Some municipalities have addressed climate adaptation by producing research reports and strategies; proclaiming that they are addressing climate adaptation (Biesbroek et al. 2009b; Termeer 2009). However, proclaiming is not equal to actually taking action. Climate change and therewith adaptation is a long-term issue. As a result, direct political commitment to climate adaptation is difficult to obtain, and it is next to impossible to maintain this commitment. This dissertation illustrates that politicians will follow current socio-economic trends (and their own ambitions) and that this might or might not result in leadership and/or commitment to climate adaptation. It is relevant for policymakers to be aware of the fact that they have a different position in the municipality. They have the ability to secure long-term issues within urban policy. Policymakers can commit to climate adaptation themselves and in this way, search for ways to establish indirect political commitment for climate adaptation. They can do so by applying deliberate strategies, such as strategic framing, demonstrate institutional entrepreneurship and initiate learning processes, in order to mainstream climate adaptation.

7.5 HOW MAINSTREAM IS MAINSTREAMING?

To close the circle, this chapter ends with some final thoughts with regard to the title of this dissertation. Despite the anticipated climate change impacts and the climate events that have already been experienced (think of, for example, the cloudburst in Copenhagen in 2011, hurricane Sandy in New York in 2012 and the heatwaves in various European cities in 2013), many municipalities have not addressed climate adaptation structurally in urban policy. This implies that the institutional void concerning the governance of climate adaptation is still present. Many of the perceived barriers to mainstreaming climate adaptation could be resolved by addressing this void. Municipalities (but also other governing institutions) need to become aware that they can and need to formulate clear rules and norms for the governance of climate adaptation. Mainstreaming of climate adaptation into urban policy will not happen without a deliberate change of the existing structures. Therefore, it is important that in both literature and practice, the urgency for the mainstreaming of climate adaptation is continually reiterated and promoted, mainstreaming is not *mainstream* yet.

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APPENDICES

APPENDIX A | Knowledge for Climate and Climate Proof Cities

The Dutch research program *Knowledge for Climate* focuses on the development of knowledge and services that would assist in making The Netherlands climate-proof. This includes an assessment of the investments needed in spatial planning and infrastructure over the coming twenty years, in order to increase the country's resilience to climate change risks. In the program, governmental organizations, businesses and research facilities closely collaborate and contribute by providing additional resources. Important aspects of the research program are international cooperation, knowledge transfer and valorization.

The research program includes eight themes: Climate Proof Flood Risk Management, Climate Proof Fresh Water Supply, Climate Adaptation for Rural Areas, Climate Proof Cities, Infrastructure and Networks, High-quality Climate Projections, Governance of Adaptation and Decision Support Tools. Within each theme, a group of researchers aims to develop new insights, models, tools and/or measures that assist in understanding the impacts and consequences of climate change for The Netherlands. Furthermore, specific locations in The Netherlands are appointed due to their vulnerability to the consequences of climate change. These eight locations are also called hotspots and function as 'real life laboratories'.

This dissertation is part of the theme: *Climate Proof Cities* (CPC). The CPC research consortium focuses on generating knowledge regarding the expected impacts of possible future climate changes, the vulnerability of cities to climate change and the effectiveness of climate adaptation measures. In addition, the aim is also to gain an in-depth understanding of the governance processes needed for the implementation of such measures. For this, various researchers from different scientific disciplines (engineering, natural and political science, spatial planning and design) work together and interact with stakeholders from several hotspots in order to generate data and information that can be used for urban adaptation strategies.

The CPC research consortium consists of ten partners: TNO (consortium leader), Delft University of Technology, Eindhoven University of Technology, Wageningen University, Utrecht University, University of Amsterdam, Radbouw University Nijmegen, Deltares, KWR Watercycle Research Institute and UNESCO-IHE. In addition, there are three foreign research partners: University of Manchester, Albert-Ludwigs-Universität Freiburg and Universität Kassel. In total 55 researchers are participating in the program, amongst which 11 PhD candidates and 3 Postdoctoral fellows.

More information is available on the following website:

http://knowledgeforclimate.climateresearchnetherlands.nl/climateproofcities

APPENDIX B | Interviews and policy documents (Chapter 2)

Abbreviation	Position / Organization	Date of interview
SD1	Project manager, Municipality of Schiedam	May 12th 2011
SD2	Civil Engineer, Municipality of Schiedam	May 20th 2011
SD3	System manager (maintenance), Municipality of Schiedam	May 31st 2011
SD4	Adviser, Water Board of Delfland	June 1st 2011
SD5	Consultant, Royal Haskoning	June 8th 2011
WF1	Adviser, Water Board of Rijnland	May 17th 2011
WF2	Present at Workshop Westflank: • Two advisers, Water Board of Rijnland • Senior project manager, Municipality of Haarlemmermeer • Policy adviser, Province of North-Holland	May 27th 2011

Planning documents on Schieveste

- Municipality of Schiedam (2002) Masterplan Schieveste
- Municipality of Schiedam (2004) De beeldkwaliteit van de Openbare Ruimte en de Gebouwen in Fase 2 van Schieveste. December 2004.
- Municipality of Schiedam (2006) Schieveste, Stedenbouwkundig plan & beeldkwaliteit fase 2. Februari 2006.
- Municipality of Schiedam (2007) Milieueffectrapportage schieveste. 20 juli 2007.
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Planning documents on Westflank

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- Eisen. Parels in de Polder. Gebiedsontwikkeling Westflank Haarlemmermeer. Januari 2010. Province of North-Holland, Haarlem
- Grontmij, NIROV, EUR (Erasmus University Rotterdam) (2011) Evaluatie watertoets 2011, Rapportage Casus Westflank Haarlemmermeer, Grondmij, NIROV & EUR. Rijksoverheid, The Hague
- PBL (2010) CPB Notitie. Beoordeling Westflank Haarlemmermeer. 26 januari 2010. PBL, The Hague
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APPENDIX C | Interviews and focus groups (Chapter 3)

ROTTERDAM

Abbr.	Policy domain	Position/ Organization	Date
C/R	Climate/ Sustainability	Program manager Rotterdam Climate Proof, Bureau of Sustainability	June 28th 2012
E/R	Environment	Program manager, Bureau of Sustainability	June 28th 2012
I/R	Infrastructure	Policy advisor Infrastructure, Department of Urban Development	June 28th 2012
PM/R	Project Management	Project manager, Department of Urban Development	June 28th 2012
PH/R	Public Health	Senior advisor Public Space and Health, Department of Public Health (GGD)	June 19th 2012
SP1/R	Spatial Planning	Project manager, Department of Urban Development	June 19th 2012
SP2/R	Spatial Planning	Urban planner, Department of Urban Development	June 29th 2012
UD/R	Urban Design	Advisor of Maintenance Public Space	June 19th 2012
W/R	Water	Policy advisor Water, Department of Urban Development	June 29th 2012

AMSTERDAM

Abbr.	Policy domain	Position / Organization	Date
C/A	Climate/ Sustainability	Board advisor Climate, Department of Administration	July 2nd 2012
E/A	Environment	Senior advisor Environment, Department of Environment and Development	June 26th 2012
I1/A	Infrastructure	Senior advisor, Department of Infrastructure	July 2nd 2012
I2/A	Infrastructure	Board advisor Infrastructure, Department of Administration	July 2nd 2012
PM/A	Project Management	Project manager, City District Nieuw West	July 6th 2012
PH1/A	Public Health	Senior advisor Disasters and Emergencies, Department of Public Health	June 26th 2012
PH2/A	Public Health	Researcher Animal Pests, Department of Public Health	June 26th 2012
SP/A	Spatial Planning	Urban planner, Department of Spatial Planning	July 2nd 2012
UD/A	Urban Design	Urban designer, Department of Spatial Planning	July 19th 2012
W1/A	Water	Strategic advisor, Waternet	July 2nd 2012
W2/A	Water	Senior policy advisor Wastewater, Waternet	July 5th 2012

THE HAGUE

Abbr.	Policy domain	Position/ Organization	Date
C/H	Climate/ Sustainability	Urban Planner / Policy Advisor Coast and Water, Department of Urban Development	June 21st 2012
E/H	Environment	Policy advisor Environment and Permits / Climate Change, Department of Urban management	June 21st 2012
I/H	Infrastructure	Policy advisor Infrastructure, Department of Urban Development	July 24th 2012
PM/H	Project Management	Project manager, Department of Urban Development	July 24th 2012
PH/H	Public Health	Manager Public Space, Department of Public Health	July 3rd 2012
UD/H	Urban Design	Urban designer, Department of Urban Development	July 3rd 2012
W/H	Water	Policy advisor Water, Department of Urban management	July 3rd 2012

FOCUS GROUPS

Municipality	Date
Rotterdam	October 1st 2012
Amsterdam	August 27th 2012
The Hague	September 20th 2012

APPENDIX D | Interviews and policy documents (Chapter 4)

Abbreviation	Position / Organization	Date of interview
A1	Alderman of Spatial Planning, Development and Climate and Energy	May 30th 2013
A2	Senior planner, Department of Spatial Planning	April 29th 2013
A3	Program director Climate and Energy, Department of Spatial Planning	May 27th 2013
A4	Senior policy advisor, Waternet	June 3rd 2013
A5	Senior plan advisor, Waternet	April 10th 2013
A6	Strategic advisor, Waternet	May 14th, 2013
A7	Strategic advisor, Waternet	May 14th 2013
A8	Program manager, Waternet	May 24th 2013
A9	Transition manager, Bureau of Engineering	April 16th, 2013
A10	Deputy director, Bureau of Engineering	May 24th 2013
A11	Policy advisor, Waternet	April 22nd 2013
A12	Asset manager Drinking water, Waternet	May 8th 2013
A13	Asset manager Sewage, Waternet	May 13th 2013
A14	Urban designer, Spatial Planning department	April 16th, 2013
A15	Urban planner, Spatial Planning department	May 16th 2013
A16	Senior project manager, TAUW BV	May 22nd 2013
A17	Project leader, City District East	May 22nd 2013
A18	Team manager maintenance, City District East	May 28th 2013
A19	Water specialist, Engineering bureau of Amsterdam	June 12th 2013
A20	Senior advisor sustainable energy, Spatial Planning department	June 12th 2013
A21	Urban designer, City District East,	18th June 2013
A22	Project leader Structuurvisie 2040, Spatial Planning department	June 20th 2013
R1	Advisor Urban Climate / Accessibility and mobility, Department of Urban development	August 9th 2013
R2	Advisor Spatial Planning and Environment, Engineering Department Public Works	May 13th 2013
R3	Advisor Sustainability, Engineering Department Public Works	May 17th 2013
R4	Advisor Water management, Department of Water	May 17th 2013
R5	Project leader RAS, Department of Sustainability	May 29th 2013
R6	Program manager Rotterdam Climate Proof, Department of Sustainability	June 28th 2012
R7	Project manager Benthemplein, Project Management Bureau	May 17th 2013
R8	Senior landscape architect, Department of Spatial Development	June 5th 2013
R9	Manager maintenance, office Kralingen-Crooswijk Noord	July 4th 2013

A = Municipality of Amsterdam, R = Municipality of Rotterdam

Policy documents and websites

- Municipality of Amsterdam (2010a) Kiezen voor de stad. *Programakkoord Amsterdam 2010–2014*.
- Municipality of Amsterdam (2010b) *Amsterdam waterbestendig*. 10 September 2010.
- Municipality of Amsterdam (2010c) *Energiestrategie Amsterdam 2040. Brug naar een duurzame energievoorziening*. February 2010.
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- Municipality of Amsterdam (2013a) *Klimaat en energie*. Available at: http://www.amsterdam.nl/wonen-leefomgeving/klimaat-energie/
- Municipality of Amsterdam (2013b) *Groene daken*. Online. Available at: <http://www.amsterdam.nl/toerisme-vrije-tijd/groen-natuur/groene_daken/>
- Municipality of Amsterdam (2013c) *Water in de stad*. Online. Available at: http://www.innovatie.waternet.nl/programma/water-in-de-stad/
- Municipality of Amsterdam (2013d) *WATERgraafsmeer*. Online. Available at: <http://www.watergraafsmeer.org/>
- Municipality of Rotterdam (2007a) *Stadsvisie Rotterdam. Ruimtelijke ontwikkelingsstrategie 2030*. 29 November 2007.
- Municipality of Rotterdam (2007b) *Waterplan 2. Werken aan water voor een aantrekkelijke stad*. August 2007.
- Municipality of Rotterdam (2010a) *Coalitieakkoord 2010–2014 'Ruimte voor Talent en Ondernemen'*. 29 April 2010.
- Municipality of Rotterdam (2010b) *Rotterdam Climate Initiative*. Online. Available at: <http://www.rotterdamclimateinitiative.nl/en>
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- Municipality of Rotterdam (2013a) *Rotterdam Adaptation Strategy – conceptual draft*.
- Municipality of Rotterdam (2013b) *Herijking Waterplan*. 5 June 2013.

APPENDIX E | Interviews (Chapter 5)

Abbreviation	Position / Organization	Date of interview
W1	Senior plan advisor, Waternet	April 10th, 2013
W2	Policy advisor, Waternet	April 22nd, 2013
W3	Manager policy and assets drinkwater/ waste water, Waternet	May 8th, 2013
W4	Asset manager Sewage, Waternet	May 13th, 2013
W5	Policy advisor, Waternet	May 14th, 2013
W6	Policy advisor, Waternet	May 14th, 2013
W7	Senior project manager, Waternet/TAUW BV	May 22nd, 2013
W8	Program manager sewage projects, Waternet	May 24th, 2013
CD1	Project manager, City District Amsterdam East	May 22nd, 2013
CD2	Team manager maintenance, City District Amsterdam East	May 28th, 2013
CD3	Urban designer public space, City District Amsterdam East	June 18th, 2013
SP1	Urban designer, City Department of Spatial Planning	April 16th, 2013
SP2	Urban planner, City Department of Spatial Planning	May 16th, 2013
IBA1	Deputy Director, Engineering Bureau Amsterdam	May 24th, 2013
IBA2	Water system specialist, Engineering Bureau Amsterdam	June 12th, 2013
Workshop	Present at Design Workshop Betondorp: City District Amsterdam East, Waternet and consultancy bureaus Nelen & Schuurmans, Tauw and Deltares.	May 22nd 2014

W = Waternet, CD = City District Amsterdam East, SP = Department of Spatial Planning, IBA = Engineering Bureau Amsterdam

APPENDIX F | Interviews (Chapter 6)

Abbreviation	Position / Organization	Date of interview
MOS01	Policy and Outreach Manager, City of Philadelphia Mayor's office of Sustainability	December 2nd, 2013
MOS02	Former policy director of sustainability, City of Philadelphia	December 4th, 2013
PWD01	Deput Commisioner Planning & Environmental Services, Philadelphia Water Department	December 3rd, 2013
PWD02	Manager, Green Infrastructure Planning, Philadelphia Water Department	December 3rd, 2013
PWD03	Chief of Staff, Philadelphia Water Department	December 3rd, 2013
PWD04	Director of the office of watersheds, Philadelphia Water Department	December 3rd, 2013
PWD05	Public manager, Philadelphia Water Department	December 6th, 2013
PWD06	Source Water Protection manager, Philadelphia Water Department	December 6th, 2013
PWD07	Strategic planner, Office of Watersheds, Philadelphia Water Department	E-mail
PWD08	Consultant, Green City Clean Waters, CDM Smith	December 6th, 2013
PWD09	Consultant, Source Water Protection, CDM Smith	December 6th, 2013
PWD10	Planner / Associate, WRT Design	December 3rd, 2013
CP01	Deputy Executive Director, Philadelphia City Planning Commission	December 4th, 2013
CP02	Senior planner, Philadelphia City Planning Commission	December 4th, 2013
CP03	First Deputy Commissioner, Philadelphia Parks and Recreation	E-mail
CP04	Environmental Health Program Administrator, Philadelphia Public Health	December 4th, 2013
CP05	Director and Professor, Center for Sustainable Communities, Temple University	December 2nd, 2013

MOS = Mayor's office of Sustainability, PWD = Philadelphia Water Department, CP = other City of Philadelphia departments

SUMMARY

Cities need to adapt to climate change, as associated risks such as heat stress and flooding can disturb and damage urban systems and services. Since the future costs of this damage are expected to be higher than the estimated investments required, cities would be wise to start to organize climate adaptation today. This dissertation addresses the governance of climate adaptation.

Municipalities play an important role in the governance of climate adaptation: they can organize responses to local impacts, set up networks and manage the allocation of resources. Although more and more municipalities are aware of the possible impacts of climate change, and recognize their role in organizing climate adaptation, the planning and implementation of responses have been slow. Various barriers hamper climate adaptation, for example, uncertainty about the risks and impacts, lack of political commitment and limited financial resources.

Consequently, municipalities are searching for different approaches to address climate adaptation in urban policy. In academic literature, two distinct governance approaches to climate adaptation have been discussed. Some researchers have argued that a new dedicated policy domain for climate adaptation needs to be developed. However, others have indicated that in practice actors are searching for solutions that not only serve climate adaptation, but integrate the adaptation objective in existing policy domains (e.g., urban planning, water management, public health). The integration of adaptation in other policy domains, also called 'mainstreaming climate adaptation', can stimulate effective policymaking through establishing synergies in objectives, increasing efficient use of resources and ensuring long-term sustainable investments. While this is considered a promising governance approach, an unequivocal understanding of the mainstreaming approach is lacking.

The aim of this dissertation is to develop an in-depth understanding of mainstreaming in relation to climate adaptation and urban policy. This is undertaken in four stages: (I) by characterizing mainstreaming, in particular, by opposing it to a dedicated approach to climate adaptation, (II) by exploring possible barriers to and opportunities for the approach, (III) by identifying strategies to promote mainstreaming, and (IV) by establishing criteria to evaluate mainstreaming in practice. This translates into the following four main research questions:

(I) How can the mainstreaming of climate adaptation be conceptualized?
(II) What are the barriers to and opportunities for mainstreaming and to what extent can these be linked to different phases of a policy process?
(III) Which deliberate strategies can promote climate adaptation in cities?
(IV) How can the mainstreaming of climate adaptation in urban policy be evaluated?

To answer these questions, the research combines multiple perspectives from various research disciplines, amongst others governance, planning, political and organizational science, to establish conceptual and analytical frameworks and apply these to empirical cases. The empirical cases are used to both exemplify and refine the conceptual understanding of mainstreaming. This dissertation consists of five articles that conjointly contribute to addressing the four research questions.

In Chapter 2, an initial conceptual model for mainstreaming climate adaptation is introduced to enhance the understanding of the concept as well as the barriers and opportunities that influence this integration process, and to explore strategies for overcoming barriers and creating opportunities. In addition to the conceptual model, a framework is created in which the mainstreaming approach is placed in contrast to the dedicated approach in order to further distinguish the characteristics of the two approaches. Two Dutch case studies - related to urban planning - are used to illustrate the value of the model and framework. The cases demonstrate the dynamic process of mainstreaming and raise discussion of the appropriate criteria to evaluate mainstreaming in relation to the aims of climate adaptation. The chapter concludes with an exploration of specific strategies to facilitate the mainstreaming of climate adaptation in existing policy domains.

Chapter 3 investigates the organizational values present in several municipal policy departments in order to explore their willingness to act upon climate adaptation and the implications for mainstreaming. Q methodology, supplemented by interviews and focus groups, applied in three major Dutch municipalities – Amsterdam, The Hague and Rotterdam – reveals three value patterns: (1) start today, (2) not for us to lead and (3) shared responsibility. These different value patterns indicate that there is a general agreement on the problem, impacts and solutions, but disagreement on the timeframe for action and the allocation of responsibilities and resources. Although all three value patterns are present within departments in each municipality, different value patterns prevail in each municipality. Additionally, the analysis shows barriers as well as opportunities for mainstreaming. A lack of political commitment and leadership, and unsupportive organizational structures create barriers. In spite of this, there is willingness to act, and strategic framing is applied to gain acceptance for the mainstreaming of climate adaptation.

Chapter 4 aims to develop conceptual understanding of the nature of political commitment in two approaches: the mainstreaming approach and the dedicated approach. The dedicated approach, based on direct political commitment to climate adaptation, implies political agenda-setting, resource allocation, and clear policy objectives which are expected to facilitate rapid implementation due to political pressure and new structures. The mainstreaming approach is based on indirect political commitment; climate adaptation 'piggybacks' on

the established commitment of policy domains in which it is integrated, and institutional entrepreneurs and framing are considered necessary to establish policy synergies and to mobilize actors and resources. An implication is that implementation of responses through mainstreaming may be erratic, as entrepreneurs have to pioneer within existing structures. The cases of two Dutch cities – Amsterdam and Rotterdam – help to illustrate and refine our propositions on the nature and implications of political commitment for the two approaches. The chapter concludes by discussing how the approaches could benefit from each other.

In Chapter 5, a framework is advanced to better understand the role of organizational routines as possible barriers to mainstreaming climate adaptation. While the mainstreaming of climate adaptation into policy documents is relatively easy, the implementation of these policies seems to be more problematic. The implementation of these policies is often undertaken by other actors in- or outside the municipal organization, who generally act based on organizational routines. Reorganizing the resources and practices of these actors to initiate mainstreaming often proves difficult, as a result of the actors' standardized routines. As organizational routines aim to provide stability, they tend to be reaffirmative. Consequently, they could prevent policy change. An analytical framework consisting of four self-reinforcing mechanisms is used to understand and explain how organizational routines can hamper the mainstreaming of climate adaptation during implementation. A case study, the planning and implementation of a water retention road in Amsterdam, is used to illustrate routines as possible barriers during implementation. The chapter concludes by stating that a change in routines is needed in order to optimize the possibilities of mainstreaming climate adaptation. To stimulate change in organizational routines, the focus should be on legitimacy building and learning.

The aim of Chapter 6 is to identify stimuli for climate adaptation in cities, and more specifically to examine how these stimuli influence the governance approach to climate adaptation – dedicated or mainstreaming. An in-depth understanding of climate adaptation stimuli is thus far lacking in literature, as most research has focused on barriers to climate adaptation. Moreover, little is yet known about the reason why certain governance approaches to climate adaptation emerge. For this explorative case study research, an early adapter was selected: Philadelphia (USA). By reconstructing the organization of two climate adaptation programs, we have identified stimuli and how these stimuli influenced the city's governance approach. The reconstruction is based on data triangulation that consists of semi-structured interviews with actors involved in these programs, policy documents and newspaper articles. The chapter illustrates the importance of stimuli such as the strategic framing of climate adaptation within wider urban agendas, political leadership, and institutional entrepreneurs. In addition, the chapter reveals that it is the combination of stimuli that influences the governance approach to climate adaptation. Some

stimuli will specifically trigger a dedicated approach to climate adaptation, while others initiate a mainstreaming approach.

In the final chapter, Chapter 7, the most important findings are summarized and reflected upon following the four research questions. This leads to the next four conclusions:

(I) Mainstreaming is conceptualized as the integration of climate adaptation objectives into existing policy domains. In the mainstreaming process, climate adaptation is one of several policy objectives, as opposed to being the main objective. The aim is to establish synergies between climate adaptation and the other policy objectives, for example by illustrating the added value of climate adaptation. In doing so, it attempts to obtain indirect political commitment and make use of the existing organizational structures (i.e. the available human and financial resources in a policy department).This also means that climate adaptation has to continuously compete with other policy objectives that could be inside or outside the mainstreaming process. As a result, the implementation of climate adaptation through mainstreaming could be erratic.

(II) The proposition was that barriers to and opportunities for mainstreaming could be linked to specific policy phases. The research findings demonstrated that this is not necessarily so. For example, institutional, organizational and financial barriers can occur during any phase of this process. This, because political commitment is easily lost to other objectives on the agenda, existing organizational values and routines can be rigid, and financial resources are limited. This implies that, in case of mainstreaming, there is a constant need to establish and sustain the urgency for climate adaptation within the municipal organization. Hence, it is also important to seize opportunities throughout the policy process to gain public support or political commitment, to change values and routines through learning processes and establish synergies to (re)allocate available resources to climate adaptation.

(III) By applying deliberate strategies, municipalities could avoid or overcome barriers to, and assist in seizing opportunities for climate adaptation. Four strategies have been identified in the research that can be initiated by the municipality. First, framing is an important tool that can be used to gain understanding, and support to act upon climate adaptation. For example, by strategically framing climate adaptation in relation to current framings used in a policy domain (e.g. water safety or sustainability), it is possible to signify the relevance of climate adaptation for that domain and gain political commitment. Second, political leadership can assist in the presentation of a clear vision regarding climate change and the organization of fast and visible adaptation actions. Third, actors inside- or outside the municipality can demonstrate institutional entrepreneurship. Institutional entrepreneurs use

their network skills to mobilize actors and resources to climate adaptation. In addition, their aim is to build legitimacy for climate adaptation by advocating alternative solutions and routines. A fourth strategy is to actively revise and rethink current organization al routines by setting up learning processes. Learning processes can provide insight into the coordination and interaction between actors and indicate ways to effectively and efficiently change these routines.

(IV) The research advances two sets of evaluation criteria for the mainstreaming of climate adaptation. The first set of criteria provides indicators to evaluate the extent of mainstreaming during a policy process (inclusion, weighting, consistency and reporting) and the other set provides criteria for the evaluation of the outcomes of mainstreaming (conformance and performance). The most important finding is that the outcomes of mainstreaming should be evaluated on performance – that is, a deliberate assessment of climate adaptation objectives in relation to the given context. An outcome that is 'fully' climate proof is difficult to achieve: certainly when climate adaptation is not the only objective in the policy process. It is important to establish whether or not climate adaptation is an added value to the outcome. Furthermore, actors might not succeed in addressing climate adaptation at first, but in spite of this, performance-based evaluation could still stimulate learning processes as actors will gain knowledge and accordingly, consider the desirability and feasibility of climate adaptation.

To conclude, this research has made a significant contribution to developing an in-depth understanding of mainstreaming of climate adaptation. Because the mainstreaming of climate adaptation is a relatively new issue in academic literature and practice, the theoretical development is occurring simultaneously with the practical implementation. As a result of this the understanding of the concept has evolved. Mainstreaming was often understood as an approach to conveniently link climate adaptation to other policy objectives, but, to address climate adaptation, mainstreaming needs to become mainstream – i.e. an approach that aims to structurally and deliberately integrate climate adaptation into urban policy. This requires municipalities (but preferably also other urban actors) to change the organizational values and routines in various policy domains. Actors in those policy domains have to consider the changes in favor of climate adaptation to be legitimate. This organizational change is expected to be a long-term process. Hence, it is important that in both literature and practice, the urgency for the mainstreaming of climate adaptation should be reiterated and promoted, as mainstreaming is not mainstream yet.

SAMENVATTING

Steden zijn gevoelig voor de gevolgen van klimaatverandering. Hittestress en droogte door toenemende temperaturen en overstromingen door hevige regenbuien en zeespiegelstijging zijn (voorbeelden van) reële risico's van klimaatverandering. Deze factoren kunnen schade veroorzaken aan stedelijke voorzieningen en netwerken. Uit onderzoek blijkt dat de toekomstige kosten van de verwachte schade in steden door klimaatverandering waarschijnlijk hoger zijn dan de huidige investeringen in adaptatiemaatregelen. Om schade in de stedelijke omgeving en onnodig hoge kosten te voorkomen, is het verstandig dat steden vandaag starten met het zich aanpassen aan klimaatverandering. Dit proefschrift richt zich op de planning en uitvoering ofwel de governance, van klimaatadaptatie in de stad.

Gemeenten spelen een belangrijke rol bij de governance van klimaatadaptatie. Zij kunnen namelijk lokale gevolgen van klimaatverandering inzichtelijk maken, verschillende actornetwerken benaderen en middelen samenbrengen en herverdelen. Hoewel een toenemend aantal gemeenten zich bewust is van de eventuele gevolgen van klimaatverandering en hun mogelijke rol in het organiseren van klimaatadaptatie, komt de planning en uitvoering van adaptatiemaatregelen slechts langzaam op gang. Verschillende barrières hinderen klimaatadaptatie. Voorbeelden daarvan zijn onzekerheid over de risico's en gevolgen ervan, het gebrek aan politiek draagvlak en de beperkte financiële middelen.

Als gevolg van deze barrières zoeken gemeenten naar andere aanpakken om klimaatadaptatie te borgen in hun stedelijk beleid. In de literatuur worden twee verschillende governance-aanpakken van klimaatadaptatie besproken. Sommige onderzoekers stellen dat klimaatadaptatie een nieuw gericht beleidsdomein nodig heeft. Anderen geven aan dat gemeenten in de praktijk op zoek zijn naar meer integrale oplossingen, waar klimaatadaptatie wordt geborgd in bestaande beleidsdomeinen, bijvoorbeeld stedelijke planning, watermanagement en gezondheidszorg. De integratie van klimaatadaptatie in andere beleidsdomeinen, ook wel mainstreaming genoemd, stimuleert mogelijk effectievere beleidsvorming door het vervlechten van doelen, het efficiënter inzetten van middelen en het verzekeren van duurzame investeringen. Hoewel dit een veelbelovende governance-aanpak is, bestaat er geen eenduidig discours omtrent mainstreaming.

Het doel van dit proefschrift is het ontwikkelen van een beter inzicht in mainstreaming in relatie tot klimaatadaptatie en stedelijk beleid. Dit gebeurt in vier stappen: (I) door het karakteriseren van mainstreamen door het onder andere te vergelijken met de gerichte aanpak, (II) door het onderzoeken van mogelijke barrières en kansen voor mainstreamen, (III) door het verkennen van strategieën om mainstreamen te bevorderen, en (IV) door het vaststellen

van criteria om mainstreamen te evalueren. Dit resulteert in de volgende vier onderzoeksvragen:

(I) Hoe kan mainstreamen worden geconceptualiseerd?
(II) Welke barrières en kansen voor mainstreamen zijn er en in hoeverre zijn deze te koppelen aan verschillende fasen van het beleidsproces?
(III) Welke doelgerichte strategieën kunnen klimaatadaptatie bevorderen in steden?
(IV) Hoe dient het mainstreamen van klimaatadaptatie in stedelijk beleid te worden geëvalueerd?

In het onderzoek worden theorieën uit verschillende onderzoeksdisciplines (o.a. governance, planologie, politicologie en bestuurskunde) gebruikt om deze vragen te beantwoorden. De theorieën dienen als input voor conceptuele en analytische kaders, die vervolgens zijn toegepast op diverse casestudies. De casestudies dragen bij aan het illustreren en het aanscherpen van het discours omtrent mainstreamen. Het proefschrift bestaat uit vijf wetenschappelijke artikelen die allen bijdragen aan het beantwoorden van de vier onderzoeksvragen.

In hoofdstuk 2 wordt een eerste aanzet gedaan voor een conceptueel model voor het mainstreamen van klimaatadaptatie. Dit model biedt inzichten in hoe het concept te definiëren, welke mogelijke barrières en mogelijkheden dit integratieproces beïnvloeden en welke strategieën gebruikt kunnen worden om barrières te slechten en mogelijkheden te creëren. Daarnaast wordt er een kader gepresenteerd waarin mainstreamen wordt vergeleken met een gerichte aanpak. Dit helpt in het onderscheiden van specifieke kenmerken voor beide aanpakken. De waarde van het conceptueel model en kader wordt getoond aan de hand van twee Nederlandse casestudies, beide gerelateerd aan stedelijke planning. De casestudies illustreren het dynamische karakter van mainstreamen en dragen bij aan de discussie over welke criteria geschikt zijn om het mainstreamen van klimaatadaptatie te evalueren. Het hoofdstuk eindigt met een verkenning van specifieke strategieën die het mainstreamen van klimaatadaptatie in bestaande beleidsdomeinen kunnen faciliteren.

Hoofdstuk 3 richt zich op het vaststellen en verklaren van percepties van klimaatadaptatie in diverse gemeentelijke beleidsafdelingen in drie Nederlandse gemeenten: Amsterdam, Rotterdam en Den Haag. Omdat het mainstreamen van klimaatadaptatie in stedelijk beleid in Nederland (maar ook in andere landen) niet verplicht is, blijft het mainstreamen vrijblijvend en lijkt het af te hangen van de welwillendheid van een beleidsafdeling. De percepties van het probleem, de risico's, de urgentie, de verantwoordelijkheid en de mogelijke oplossingen kunnen bepalend zijn voor waarom een gemeentelijke afdeling wel of niet kiest voor het mainstreamen van klimaatadaptatie in haar beleid. Met behulp van de Q-methode zijn er drie percepties van klimaatadaptatie vastgesteld: (I) 'begin vandaag', (2) 'niet een hoofdtaak' en (3) 'gedeelde verantwoordelijkheid'. Bij deze percepties denkt men hetzelfde over het probleem, de risico's en de mogelijke oplossingen, maar bestaat er onenigheid over wanneer

er moet worden gehandeld en over de verdeling van verantwoordelijkheden. In iedere gemeente domineert een andere perceptie, maar zijn wel alle drie de percepties terug te vinden. Daarnaast biedt de aanvullende analyse over het verklaren van de percepties binnen de gemeenten op basis van interviews en focusgroepen, inzichten in barrières en mogelijkheden voor mainstreamen. Zo blijken er barrières te zijn vanwege een gebrek aan politiek draagvlak en leiderschap en vanwege organisatiestructuren die klimaatadaptatie niet ondersteunen. Aan de andere kant blijken de meeste gemeentelijke afdelingen bereid om te handelen en wordt er door middel van strategisch framen draagvlak gegenereerd voor het mainstreamen van klimaatadaptatie.

In hoofdstuk 4 is het doel om de rol van het politieke draagvlak in de twee aanpakken – mainstreamen en de gerichte aanpak – te conceptualiseren. De gerichte aanpak is gebaseerd op direct politiek draagvlak voor klimaatadaptatie. Dit houdt in dat klimaatadaptatie op de politieke agenda staat, er middelen zijn toebedeeld en er specifieke beleidsdoelen voor zijn opgesteld. Dit leidt mogelijk tot een snelle planning en uitvoering van klimaatadaptatiemaatregelen, omdat er politieke druk is en nieuwe organisatiestructuren zijn gecreëerd. Mainstreamen is gebaseerd op een indirect politiek draagvlak: omdat klimaatadaptatie wordt geïntegreerd in een beleidsdomein kan het meeliften op het reeds bestaande draagvlak van dat domein. Voor mainstreamen zijn beleidskoppelaars en framing belangrijke strategieën voor het creëren van beleidssynergieën en het mobiliseren van actoren en middelen. De beleidskoppelaars zullen moeten pionieren binnen de bestaande organisatiestructuren. Dit kan als gevolg hebben dat bij mainstreamen de uitvoering van klimaatadaptatiemaatregelen niet vanzelfsprekend is. Twee Nederlandse steden, Amsterdam en Rotterdam, worden gebruikt als casestudies om de veronderstellingen over de rol van politiek draagvlak in de twee aanpakken te illustreren en te verfijnen. Het hoofdstuk eindigt met een discussie over hoe de twee aanpakken van elkaar zouden kunnen profiteren.

Tijdens de uitvoeringsfase worden vaak barrières voor klimaatadaptatie ervaren. Om te begrijpen hoe organisatorische routines mogelijk barrières vormen voor het mainstreamen van klimaatadaptatie, wordt er in hoofdstuk 5 een analytisch kader gepresenteerd. In de uitvoeringsfase is het belangrijk om te begrijpen hoe actoren het beleid dat zij moeten uitvoeren interpreteren en kunnen doorvoeren. Het mainstreamen van klimaatadaptatie vraagt mogelijk dat deze actoren hun middelen en handelingen anders inzetten dan wel uitvoeren, maar dit is niet altijd mogelijk omdat zij handelen op basis van bepaalde routines. Organisatorische routines bestaan omdat ze stabiliteit en een duidelijk handelingsperspectief genereren. Dit betekent echter eventueel ook dat ze mogelijke beleidsveranderingen in de weg staan. In het analytisch kader zijn vier zelfversterkende mechanismen (complementariteit, coördinatie, leerprocessen en verwachtingen) opgenomen die kunnen verklaren hoe organisatorische routines het mainstreamen van klimaatadaptatie bemoeilijken

tijdens de uitvoeringsfase. Een casestudie over De Waterbergende Weg in Amsterdam wordt gebruikt om te illustreren hoe routines als barrières kunnen optreden. Het hoofdstuk eindigt met de conclusie dat een verandering in de organisatorische routines nodig is om de kansen voor het mainstreamen van klimaatadaptatie te vergroten. Om verandering in routines te stimuleren, zou de focus moeten liggen op het verkrijgen van legitimiteit en het opzetten van leerprocessen.

In hoofdstuk 6 wordt aandacht besteed aan stimulansen die hebben bijgedragen aan klimaatadaptatie in steden. Een overzicht van stimulansen voor klimaatadaptatie mist tot nu toe in de literatuur, omdat de meeste onderzoeken zich richten op de barrières voor klimaatadaptatie. Daarnaast wordt de vraag gesteld of deze stimulansen hebben geleid tot een bepaalde governance-aanpak, bijvoorbeeld een gerichte aanpak of mainstreamen. Om dit te onderzoeken is een voorloper in klimaatadaptatie geselecteerd: Philadelphia (Verenigde Staten). Voor het verkennen van stimulansen en hoe deze mogelijk hebben geleid tot een governance-aanpak is de planning en uitvoering van twee klimaatadaptatieprogramma's in deze stad gereconstrueerd. De reconstructie is gebaseerd op semi-gestructureerde interviews met actoren die hebben meegewerkt aan de programma's, een beleidsdocumentenanalyse en een analyse van mediaberichten. Het onderzoek in dit hoofdstuk laat zien dat stimulansen zoals het strategisch 'framen' van klimaatadaptatie binnen andere stedelijke beleidsagenda's, politiek leiderschap en beleidskoppelaars, een belangrijke rol hebben gespeeld in Philadelphia. Sommige stimulansen zullen inderdaad eerder leiden tot een gerichte aanpak, terwijl andere kunnen aanzetten tot mainstreamen. Hierbij wordt wel opgemerkt dat het mogelijk gaat om een combinatie van stimulansen die leidt tot een bepaalde governance-aanpak.

In het laatste hoofdstuk (hoofdstuk 7) wordt er aan de hand van de vier eerdergenoemde onderzoeksvragen een samenvatting gegeven van en gereflecteerd op de belangrijkste bevindingen. Dit resulteert in de volgende vier conclusies:

(I) Mainstreamen wordt geconceptualiseerd als het integreren van klimaatadaptatiedoelen in bestaande beleidsdomeinen. Tijdens dit integratieproces is klimaatadaptatie één van de beleidsdoelen in plaats van het hoofddoel. Het doel van mainstreamen is om synergieën te creëren tussen klimaatadaptatie en andere beleidsdoelen door onder andere de toegevoegde waarde van klimaatadaptatie te duiden voor het beleidsdomein. Op deze manier is het mogelijk om indirect politiek draagvlak te verkrijgen en gebruik te maken van de bestaande organisatiestructuren, zoals beschikbare mankracht en financiële middelen in het betreffende beleidsdomein. In het geval van mainstreamen is klimaatadaptatie continu aan het concurreren met andere beleidsdoelen die binnen of buiten het beleidsproces vallen. Hierdoor is de

implementatie van klimaatadaptatiemaatregelen op basis van mainstreamen niet vanzelfsprekend.

(II) De verwachting was dat barrières en kansen voor mainstreamen gekoppeld konden worden aan bepaalde fasen van het beleidsproces. De onderzoeksresultaten laten zien dat dit in de praktijk niet altijd het geval is. Zo kunnen institutionele, organisatorische en financiële barrières tijdens elke fase van het beleidsproces voorkomen. Dit kan verklaard worden door politiek draagvlak dat makkelijk kan worden vergeven aan andere onderwerpen op de agenda, bestaande percepties en organisatorische routines die star en moeilijk te veranderen kunnen zijn en beperkte aanwezige financiële middelen. Dit geeft aan dat bij mainstreamen er een continue noodzaak is om in de gemeentelijke organisatie de urgentie voor klimaatadaptatie te waarborgen. Daarnaast is het belangrijk om de mogelijke kansen die tijdens het beleidsproces voorbij komen te benutten. Op deze manier kan maatschappelijk dan wel politiek draagvlak gegenereerd worden, en percepties en routines veranderd worden door leerprocessen en beschikbare mid delen te koppelen aan klimaatadaptatie door het maken van synergieën.

(III) Gemeenten kunnen barrières voor klimaatadaptatie ontwijken dan wel voorkomen en kansen proberen te pakken door zelf strategieën in te zetten. In het onderzoek zijn vier strategieën geïdentificeerd die doelbewust door de gemeenten kunnen worden ingezet. Ten eerste kan framen een belangrijke strategie zijn om het doel en belang van klimaatadaptatie te duiden en op deze manier draagvlak te creëren voor klimaatadaptatie. Door bijvoorbeeld klimaatadaptatie uit te leggen aan de hand van bestaande discoursen in het beleidsdomein (denk bijvoorbeeld aan waterveiligheid of duurzaamheid), is het mogelijk om de relevantie van klimaatadaptatie voor dat beleidsdomein te duiden en mogelijk (indirect) politiek draagvlak te verkrijgen. Ten tweede kan politiek leiderschap ingezet worden als strategie. Politici kunnen een belangrijke rol spelen in het presenteren van een duidelijke visie voor klimaatadaptatie en het organiseren van snelle en zichtbare adaptatiemaatregelen. Ten derde kunnen actoren van binnen en buiten de gemeentelijke organisatie optreden als beleidskoppelaars. Beleidskoppelaars gebruiken hun netwerkvaardigheden om andere actoren en middelen te mobiliseren voor klimaatadaptatie. Daarnaast proberen beleidskoppelaars mogelijk alternatieve oplossingen en routines aan te dragen en daar draagvlak voor te vinden. De vierde strategie is het opzetten van leerprocessen om zo actief na te denken over hoe bestaande organisatorische routines veranderd of herzien kunnen worden. Leerprocessen kunnen worden gebruikt om inzicht te krijgen in hoe de coördinatie en interactie tussen verschillende actoren verloopt en mogelijk wijzen op nieuwe manieren om de routines effectief en efficiënt te veranderen.

(IV) Het onderzoek presenteert twee sets van criteria voor het evalueren van het mainstreamen van klimaatadaptatie. De eerste set van criteria bestaat uit vier indicatoren die gebruikt kunnen worden om de mate van mainstreaming in het beleidsproces te meten (inclusie, prioriteit, consistentie en terugkoppeling). De andere set bestaat uit criteria om de uitkomsten van mainstreamen te evalueren (conformiteit en performance). De belangrijkste bevinding is dat de uitkomsten van mainstreamen geëvalueerd moeten worden op basis van performance – dat wil zeggen dat de nut en noodzaak van klimaatadaptatie in relatie tot de gegeven context dient te worden beoordeeld. Een uitkomst die volledig klimaatbestendig is, is lastig te behalen, zeker wanneer klimaat adaptatie niet het enige doel is in het beleidsproces, zoals dat het geval is bij mainstreamen. Het is belangrijk om te overwegen of klimaatadaptatie van toegevoegde waarde is voor de uitkomst. Daarnaast zullen actoren mogelijk niet meteen slagen in het organiseren van klimaatadaptatiemaatregelen, maar wanneer er op basis van performance geëvalueerd wordt, kan dit nog steeds leerprocessen stimuleren. Actoren zullen namelijk wel kennis over klimaatadaptatie vergaren en mogelijk in een volgend beleidsproces het belang van klimaatadaptatie en de haalbaarheid van mogelijke maatregelen opnieuw overwegen.

Dit onderzoek levert op basis van deze conclusies een belangrijke bijdrage aan het ontwikkelen van een beter inzicht in het mainstreamen van klimaatadaptatie in stedelijk beleid. Hierbij wordt echter de kanttekening gemaakt dat het mainstreamen van klimaatadaptatie een relatief nieuw onderwerp is in de academische literatuur en in de praktijk. De theoretische ontwikkeling van het concept vindt plaats gelijktijdig met de uitvoering in de praktijk. Hierdoor is de conceptualisering van mainstreamen geëvolueerd. Mainstreamen werd eerst gedefiniëerd als een aanpak waarbij klimaatadaptatie waar mogelijk gekoppeld werd aan bestaande beleidsdoelen, maar wanneer klimaatadaptatie als urgent wordt gezien is het belangrijk dat het mainstreamen van klimaatadaptatie mainstream wordt. Dat wil zeggen: een governance-aanpak die zich richt op het structureel en weloverwogen integreren van klimaatadaptatie in stedelijk beleid. Dat vraagt dat gemeenten (maar mogelijk ook andere actoren in de stad) hun percepties en organisatorische routines binnen verschillende beleidsdomeinen veranderen. Hierbij is het belangrijk dat de actoren in de beleidsdomeinen de veranderingen ten behoeve van klimaatadaptatie legitiem vinden. Naar verwachting is deze organisatorische verandering een langetermijnproces. Daarom is het van belang dat zowel in de academische literatuur als in de praktijk, urgentie voor het mainstreamen van klimaatadaptatie wordt gecontinueerd en gestimuleerd. Voor nu geldt namelijk: mainstreamen is nog niet mainstream.

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Caroline Josephina Uittenbroek (1985) has a bachelor degree in Spatial Planning (2004-2007) and a masters' degree in Metropolitan Studies (2007-2010), both obtained at the University of Amsterdam. During her masters' degree, she went abroad for eight months to study Real Estate and Urban design at Portland State University in Portland (OR), USA. For her thesis, she compared the City of Portland with the City of Amsterdam on the topic of collaborations between public and private actors in urban development.

In September 2010, she started her PhD research on the mainstreaming of climate adaptation into urban policy, at Utrecht University and University of Amsterdam. In the following three-and-a-half years, she presented her work at various conferences such as AESOP, ECCA, PLPR and Delta conference. Thanks to the format of the Knowledge for Climate program, she was fortunate to work with an interdisciplinary team consisting of policymakers and researchers working within different fields.

She is currently involved in a research project on the legitimacy of the current allocation of public and private responsibilities for climate adaptation in four sectors (energy, ICT, transport and public health). This research should provide input for the Dutch National Adaptation Strategy which is due 2017. This research was carried out by Utrecht University and commissioned by Knowledge for Climate, PBL Netherlands Environmental Assessment Agency and the Ministry of Infrastructure and Environment.

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