Helping cities to govern flood risk

A comparative case study to identify the barriers and enablers imposed by national policy

Student
Fabian Francis Gomes Monteiro
3534391

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Supervisors
S.H.A. Koop, MSc and
Prof. Dr. C.J. van Leeuwen

Second reader
dr. Carel Dieperink

Internship Organization
KWR Water Cycle Research Institute
The Netherlands

Abstract

This research will compare the various components of the capacity to address flood risk in Milton Keynes and Rotterdam. Both cities are prone to flooding, share similar urban infrastructures and have active city councils which promote sustainability and innovation. However, both cities have very different geological features and operate within their unique national context. Although this research acknowledges the importance of the geological, economical and sociological context on flooding and flood risk management, this study will focus on the policy (context) frame and the influence it has on managing flood risks. This research tries to answer the following question: To what extent do European, national and regional policy frames enable cities to improve their capacity to govern flood risk challenges in the UK and the Netherlands, if necessary? This research will comprise both a desk study and empirical field work. The Governance capacity framework will be applied to both cities and will complement the applied methodology. Interviews were conducted in both cities with experts and officials; policy documents were analysed in order to verify the outcome of these interviews. Finally, the policy frame will be analysed for both cities and its influence on the governance capacities will be assessed. This study has shown that the policy frame does have an impact on cities to govern their flood risk and has provided new insights which can help cities to better govern their flood risk. The extent to which European, national and regional policies influence the capacity of cities to govern their flood risk has become more apparent. Imposed policies have enabled cities in both cases to improve their capacity to govern flood risk and freedom to manoeuvre inside these frames exists and freedom to improve most governance capacity remains at the local level. These findings will bridge the existing knowledge gap in the scientific literature and can help cities become more resilient to flood risks in the future.

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Chapter 1. Introduction

1.1 The challenges of urban flood risk governance

The urban population is rapidly growing worldwide and in 2014 an estimated 54 per cent of the human population was living in cities and it is estimated that around 2050, 66 per cent of the population will be urban dwellers (UN, 2015). There will be more mega cities and many smaller cities and sustainable city management seems to be crucial for human society to continue to flourish. This continuous urbanization is coupled with increasingly urgent challenges such as the issue of increased flood risk (World Economic Forum, 2016; Koop & Van Leeuwen, 2016). According to the most comprehensive scientific studies and climate models, the frequency and intensity of floods in Europe, will increase in the near future (Rojas et al., 2013; Frei et al., 2006; Christensen & Christensen, 2007). This will cause thousands of civilian casualties and damage to economies for billions of euros (Forzieri et al., 2017; EEA, 2010). Flood events will pose a huge risk to the urban population in the form of extreme precipitation, due to sea-level rise and extreme river discharges. It is estimated that around 15% of the global population, mainly urban dwellers, are at risk due to these extreme water events related to climate change (Ligtvoet et al. 2014; EEA 2012). These predicted impacts on the urban population will cause societal unrest and will instigate large migration flows which are expected to destabilize local, regional and the national order (Intergovernmental Panel on Climate Change, 2014). Economic loss due to damages to infrastructure, agriculture, and industry caused by flooding will most likely destabilize the world market and their related indices (Bouwer, 2011; Stern, 2013). According to the UN, European cities are most prone to intense rainfall events, sea level rise and are second to North America if it comes to being at risk from floods (UN habitat, 2016).

The scientific community is aware that climate change will have an impact on the hydrological cycle leading to an increase in the frequency, magnitude and intensity of extreme precipitation events (Rojas et al., 2013; Frei et al., 2006; Christensen and Christensen, 2007; Fowler and Ekström, 2009; van der Linden and Mitchell, 2009; Nikulin et al., 2011). This phenomenon is expected to increase flood events in Europe. Annual flood losses are expected to increase from 4.2 billion euros per year, which is the current annual loss, to 23.5 billion euros per year in 2050 (Jongman et al., 2014). Urban development is also known to increase the risk of flooding, mainly pluvial and fluvial flooding due to the increase of hard impermeable surfaces and the urban expansion in flood prone areas (Nirupama & Simonovic, 2007; Serre et al, 2012). By combining both factors it becomes obvious that the occurrences of flood events will impact cities in the future on a more regular basis. Costs related to flooding are expected to reach a 100 billion a year worldwide at the end of this century. Three quarters of the damage will occur in cities, increasing the importance of managing these risks (Serre et al, 2012). During the first decade of the 21st century, the European Environmental Agency (EEA) calculated that in Europe alone, 213 flood events had an impact on more than 3 million people, killing 1126 people and having caused around €53 billion in economic losses of which €12 billion were insured economic losses (EEA, 2010). According to Rojas et al. (2013) Western European countries such as the Netherlands and the United Kingdom are expected to have the highest increase in annual damages due to floods. The flood which occurred in the United Kingdom during the summer of 2007 accounted for 4.4 billion euro in losses alone, thus having an enormous national socio-economic impact (Chatterton et al, 2010). These huge societal welfare losses pose risks to economic and national security.

Climate adaptation and flood risk management can help mitigate these losses, and further research is needed in how cities and societies can improve their capacity to govern these flood risks. There is a certain scientific consensus that geographical and economic context are of significant importance in the way cities manage their flood risk (Leopold & Miller, 1956; Boyle, 1998; Alcantara-Ayala, 2002; Mirza, 2003; Brouwer, 2007: White, 2010). Thus, making these contexts less suitable to build new scientific theory on. There also seems to be an understanding in the scientific literature that the policy context has an influence on the ability of cities to govern certain problems and risks (Hezri and Dovers, 2006; Craft and Howlett, 2012). However, very little research is done on the exact influence this policy

framework has on the ability of cities to govern certain issues, more precisely, what effect this policy frame has on the governance capacity of cities to address flood risk (Næss et al.,2005; Bulkeley, 2010). Moreover, there is no available research, assessing the level of influence of the framework of regional, national and international policies has on the ability of cities to govern their flood risk.

1.2 Literature gap and research objective

Although increasingly research is done in the field of flood risk governance (e.g. STAR-FLOOD, 2016; Wiering et al., 2016; Dieperink et al., 2016), still very little research is done assessing the governing capacity of cities to address floods (Koop et al., 2017; Alexander et al., 2016) and the influence the policy frame has on the governance capacity of cities remains vague (Burby, 2006). Some research has been done on the hampering and enabling factors for good governance (e.g. OECD, 2015b) and these studies have significant scientific value. However, these studies either tend to be very generic and overly theoretic such as the social ecological system approach, making it hard to validate the produced findings in practice (Kerberger and Waarden, 2014; Biesbroek et al. 2013) or these studies have a narrow focus using specific single case studies which make it hard to extrapolate results (Measham et al. 2011; Plummer et al. 2012). Thus, the discussed limited scientific insight into how the policy framework shapes the required characteristics of urban governance capacity to address flood risk remains. However, the context specific variations in each urban area make it hard to compare different cities. In order to make these comparisons more meaningful I want to study the influence of the policy context on the governance capacity of cities in relation to flood risk management. There seems to be a certain scientific acknowledgement that policies play a role in the ability of cities to govern flood risks (Burby, 2006), but to what extent and in which exact ways remains unclear (Morgan, 1997; Næss et al., 2005; Bulkeley & Kern, 2006; Bulkeley, 2010). Hence, there is limited scientific insight into how the regional, national and international policy framework shapes the required characteristics of urban governance capacity to address flood risks. A cross-case analysis can explain and help clarify the precise impact that this policy framework has on the ability of cities to govern their flood risk. This is the knowledge gap that this research tries to address and by doing so this study is engaging in the theoretical debate surrounding this topic with new findings, striving to reaffirm the relevance of further research on this subject. Because of the inherent importance that definitions have, in assessing governance capacity, this study adheres to the definition as described by Koop et al. (2017) who define governance capacity as: *the key set of governance conditions that should be developed to enable change that will be effective in finding dynamic solutions for governance challenges of water, waste, and climate change in cities*". This definition stresses the fact that developed governance capacity does not directly lead to the creation of effective problem solving policies, it merely is seen as an enabling factor and precondition for the formulation and implementation of effective policy. Furthermore, by applying the Governance Capacity Framework (GCF; Koop et al. 2017) to a city in the Netherlands and a city in the United Kingdom, the influence of European, national and regional policy on the capacity of cities to govern flood risk is studied. The overall aim of this thesis is to gain insight into the influence of European, national and regional policy frame on the capacity of cities to govern flood risks and this study attempts to fill these empirical gaps by formulating and answering specific research questions, which will be presented in the following section.

1.2 Research questions

Based on the research objective the following research question is formulated:

To what extent do the European, national and regional policy frames enable cities to improve their capacity to govern flood risk challenges in the UK and the Netherlands?

This main question is being answered by three complementary sub-questions:

Sub-question 1: *To what extend does the European, national and regional policy frames limit or encourage ability of cities to address their flood risk challenges?*

The first step in answering this research question is to evaluate the extent to which the Dutch and United Kingdom's supranational, national and regional policy frames influence urban flood risk management in both countries. An evaluation frame is developed to analyse the multi-level policy frame in both the UK and the Netherlands.

Sub-question 2: *What are the key opportunities to enhance the urban water network's governance capacity to address flood risk challenges in Milton Keynes and Rotterdam?*

The second step of this research is to assess the governance capacity of a city in the Netherlands and a city in the United Kingdom. In doing so, the governance capacity of the city of Rotterdam and the city of Milton Keynes are analysed and key opportunities for improving the city's capacity to govern flood risk are being identified.

Sub-question 3: *Is there a difference in the degree of importance of governance conditions and indicators between cities in the UK and the Netherlands as result of European, national and regional policy frame?*

The third step is to create an overview of the difference in importance of certain governance conditions which enable each city to effectively govern their flood risks, as a result of the different multi-level policy frames of both countries. These results may provide valuable results to understand the key opportunities and limitations imposed to cities in the two different countries and help these cities identify opportunities to improve their flood risk management. Moreover, these results may provide valuable insight to enhance meaningful city-to-city learning and can help decision makers and policy makers, to strengthen the capacity of their city to govern their specific flood risk challenges.

1.3. Thesis structure

This research is designed in such a way, namely by means of a comparative case study approach of the policy frames and urban governance capacity in the cities of Milton Keynes in the UK and the city of Rotterdam in the Netherlands. Rotterdam and Milton Keynes are both cities which have an increased risk of flooding and during the recent years both cities have experienced numerous small scale flooding's (MediaTV, 2016; MKCitizen, 2016). By selecting two European cities this research strives to provide results which can help the cities which are most prone to these flood risks to better govern these risks, thus strengthening the societal value of this research.

In the second chapter, named methods, the multiple methods which are applied in this thesis in order to get results and answer the research questions are explained and justified. First, the method that will be used to create the policy frame and to select evaluation criteria for the policy frame analysis will be explained. Second, the method to analyse the governance capacity of Milton Keynes and Rotterdam will be introduced. Lastly, the method to assess the dynamic between the policy frame and the governance capacity will be described in this chapter. In chapter three, results, naturally the policy frame will be analysed and the results of each analysed flood risk policy will be visible in a summary table using a Likert scoring. The results of the governance capacity analysis will also be presented in this chapter, followed by an argumentation as to why certain governance capacities are more important with regard to each national policy frame. This chapter will be followed up upon by the discussion section wherein I will stress the importance of my results. The limitations of this study with regard to the applied methods, the data and results will also be elaborated upon in this chapter. In the final chapter, the conclusion, this study will conclude with a summary of the results and by answering all research questions, thus attaining its objectives and research aim.

Chapter 2. Methods

In this research, multiple methods are used in order to be able to answer the research questions; a schematic overview is given in figure 1. The first sub question will be answered by conducting a literature review on the available scientific works assessing the influence of the supranational, national and regional policies on flood risk management. The second method for answering this sub question is a desk study wherein supranational, national and regional policy documents regarding the flood risk management of each individual city are analysed. The first method applied in order to answer the second sub question will be a stakeholder analysis, in order to identify important stakeholders in the urban flood risk management network of each city. Next, the Governance Capacity Framework (GCF) will be applied to these identified stakeholders, which is an empirical assessment of the governance capacity of each city. The method applied for answering the third and final sub question is an assessment of the interrelationship between the governance capacity of each city and the policy frame of each city. After this assessment a prioritisation of governance conditions will be made for each city in order to improve the most limiting conditions that hamper the governance capacity of each city to address flood risk. In this manner this research will answer the final sub question, enabling a formulation of the answer to the main question.

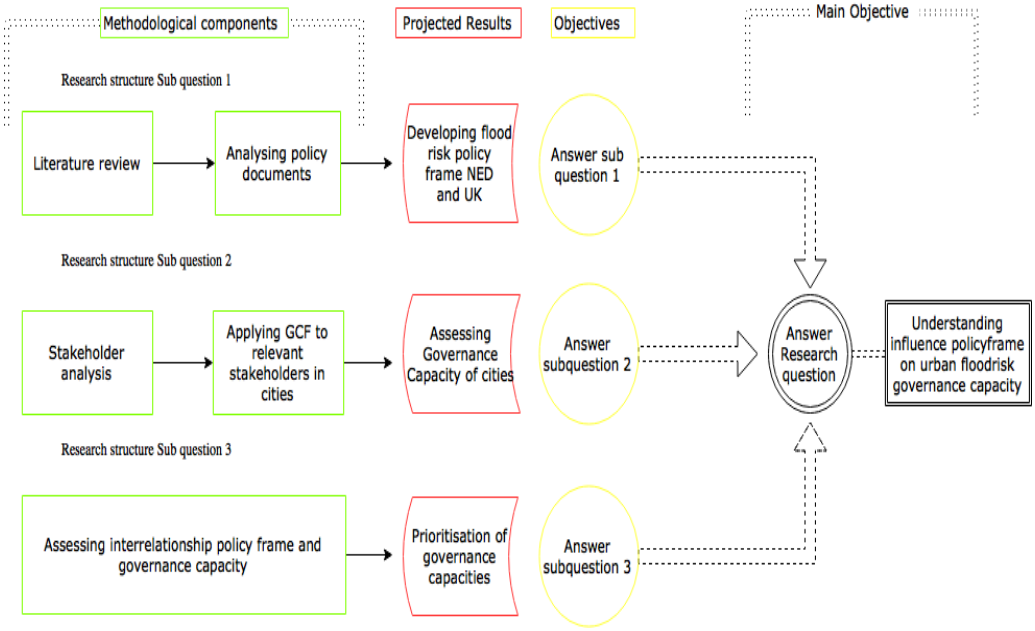

Figure 1. Research framework.

All the methods will be described in more detail in the following sections.

Chapter 2.1. Policy frame analysis

To say something about the effectiveness of flood risk policy is a somewhat peculiar endeavor. Flood events are very irregular in timespan, complex in nature and heterogeneous in spatial location. These factors make it hard to assess the policies in place to manage flood risk. Flood events have to occur ex post the implementation of the flood risk policies before these policies can be assessed for their relative effectiveness. Moreover, the differences in nature of the flood risk, which are dependent on a myriad of variables, are also hard to predict, measure and also vary per location. Furthermore, it can be argued that a flood risk policy has to be effective in order to be formulated and implemented in the first place. Because flood risk policy is created in the arena of environmental policy, risk management policy and emergency planning, different analysis criteria can be applied to this kind of policy. Although many policy analyses, evaluation criteria and frameworks exist, there is no real consensus on which criteria are most important and what the definitions of these criteria exactly are. Terms such as fairness, resilience, effectiveness, efficiency, sustainability and, legitimacy are composed of different building blocks according to different authors. However, there is no consensus on which exact building blocks are needed to give substance to these widely used terms. It is one of the biggest conundrums in (social) science today, that different authors uphold different meanings to similar concepts (Funtowicz & Ravetz, 1995). Standardization of these definitions or smaller building blocks is not likely to happen, as scientist are critical in thought and weary of single truths. This reality does however make the selection of criteria susceptible to subjectivity. Hence, the selection of criteria is not wholly objective and selecting criteria for evaluating and analyzing policy is therefore, arguably one of the most arduous processes for this research.

A literature review will be conducted in order to create a new empirical policy analysis framework, based on scientific literature. Google scholar and Scopus will be the two main data bases from which the literature will be extracted. The search terms used most often are: policy effectiveness, flood risk policy effectiveness, environmental policy analysis, policy evaluation criteria, environmental policy evaluation criteria, adaptive management. The scientific journals selected most often as a search criteria were: Water Policy; Environmental Policy and Governance; Environmental Science & Policy; Environment, Development and Sustainability. An extensive part of the desk research will be dedicated to analysing policy documents which will enable to formulate and analyse the European, national and regional policy frame, to which the cities of Milton Keynes and Rotterdam have to adhere in relation to flood risk management. Existing policy will be analysed by applying the policy frame analysis to the implemented policy documents of each city to address flood risk challenges. By doing so, I want to develop a new, more tangible framework to analyze and evaluate policies that is in line with the prevailing definition in scientific literature. It is therefore chosen to select criteria which can be more clearly derived from the policy framework and have arguably clearer meanings which are being less debated on in scientific literature.

In order to adequately score and visualize the results of this new analytical frame, a Likert-type scale will be used. In the first section of the results of every policy frame of each respective case, there will be a summary table which provides a quick overview of the results of each analyzed policy. These policies, will be assessed via a Likert-type scale, zero (0) represents a neutral (sub-optimal) score of the criteria, a minus (-) represents a negative score and a plus (+) represents a positive score of the criteria.

2.2 Governance capacity analysis

2.2.1. Introduction to the Governance Capacity Framework.

The Governance Capacity Framework (GCF) aims to identify and quantify the governance capacity of a city relating to different water challenges, thus supporting decision makers and policy makers to take adequate measures to strengthen a city's capacity to govern water challenges. The GCF is one of the first attempts to develop a comprehensive, comparable and consistent method that assesses the water governance capacity at the city scale (Koop et al., 2017). The GCF is an operationalization of the concept of governance capacity into a diagnostic empirical analysis that provides a frame to enable structured comparison between cities water governance challenges and allows for the build-up of theory and the identification of transferable lessons (Schreurs et al., 2017; Koop et al., 2017). It is composed out of three dimensions: knowing, wanting and enabling, which are in turn comprised of nine conditions in total. An overview is given in Figure 1. The framework has already been applied to individual cities such as Quito (Schreurs et al., 2017), Ahmedabad and Amsterdam (Koop et al., 2017). This Governance Capacity Framework aims to be a diagnostic tool providing an audit for cities to take further action upon.

2.2.2 The methodology behind the Governance Capacity Framework.

The Governance Capacity Framework (GCF) is applied as follows; by using a triangular method. First a preliminary analysis is made by analysing policy reports; second, important stakeholders from the urban water network of each city are interviewed using twenty seven predefined questions to assess the governance capacity. Third, after the interviews people will receive the results and are asked to give feedback, they also have the opportunity to provide additional information which can be included in the final scoring (Koop et al., 2017; Watershare, 2017).

The governance capacity framework requires a stakeholder analysis in order to identity and select diverse and representative interviewees. Without the right interviewees, the framework will not provide the needed empirical results. A stakeholder analysis will be done before commencing field work. The Governance Capacity framework will be applied to the case of Rotterdam and the case of Milton Keynes. The core of the methodology applied in this research consists out of the Governance Capacity Framework. This framework is based on an extensive literature research with a focus on governance capacity. The Governance Capacity Frame is depicted in figure 1.

Dimensions	Condition	Indicators
Knowing	**1 Awareness**	1.1 Community knowledge 1.2 Local sense of urgency 1.3 Behavioral internalization
	2 Useful knowledge	2.1 Information availability 2.2 Information transparency 2.3 Knowledge cohesion
	3 Continuous learning	3.1 Smart monitoring 3.2 Evaluation 3.3 Cross-stakeholder learning
Wanting	**4 Stakeholder engagement process**	4.1 Stakeholder inclusiveness 4.2 Protection of core values 4.3 Progress and variety of options
	5 Management ambition	5.1 Ambitious and realistic management 5.2 Discourse embedding 5.3 Management cohesion
	6 Agents of change	6.1 Entrepreneurial agents 6.2 Collaborative agents 6.3 Visionary agents
Enabling	**7 Multi-level network potential**	7.1 Room to manoeuver 7.2 Clear division of responsibilities 7.3 Authority
	8 Financial viability	8.1 Affordability 8.2 Consumer willingness-to-pay 8.3 Financial continuation
	9 Implementing capacity	9.1 Policy instruments 9.2 Statutory compliance 9.3 Preparedness

Figure 2. The Governance Capacity Framework (Koop et al., 2017).

Chapter 3. Results

3.1 Policy frame analysis

Dealing with uncertainty

Uncertainties have become more important during the last decade, especially in the environmental sciences and social sciences. Some big and influential studies have been receiving critique on having relied too heavily on uncertain data sets, such as complex climate model predictions (Schiermeier, 2010; Hulme & Mahony, 2010). Or not having addressed the uncertainty, which is inherent to the process of climate change (Urry, 2015). These uncertainties have proven to support the reasoning of the climate skepticism rhetoric, which has recently become more dominant in the political arena of western states such as the United States, Australia and Poland (Business insider, 2016; The Guardian, 2017; Reuters, 2015).. Dealing with uncertainty is also important if society wants to adequately translate scientific findings into policy regarding the issue of flooding. Flooding is related to factors such as population growth, urbanization and climate change, which makes it important to incorporate uncertainty if one is to evaluate flood risk management policies. Dealing with uncertainty is also an important aspect of adaptive management, which strives to better harmonize governance and ecosystem processes (Medema et al., 2008). This theory stems from the social ecological system theory (Olsson et al, 2004) and authors of the social ecological system theory have been observed to attribute a cure-all trait to this macro level approach (Ostrom et al., 2007). However, adaptive management theory also acknowledges the fact that decisions made, in the real world, by natural resource managers are influenced by uncertainties and complexities which are not represented in the traditional systemic scientific discourse, which argues that ecosystem management is predictable and linear (Gunderson and Holling 2002; Folke et al. 2002; Berkes 2009). By addressing uncertainties in policies, the policies will encompass and address a larger range of possible scenarios, increasing the likelihood that it becomes more effective in addressing the issue of flooding. This improved adaptability is another importance aspect included in the approach to address uncertainty in flood risk management (Fischhendler, 2004; Roth & Warner, 2007; Folke et al., 2005). This criterion is aimed at assessing the extent to which uncertainty is taken in to account.

Policy evaluation

Evaluation of policies is seen as one of the basic methods to analyze policies and it is needed to strengthen future policies by uncovering strengths and weaknesses of current implemented policies (Patton & Sawicki, 1993). By evaluating policies, the policy can be improved where needed. The evaluation can happen at multiple levels and can be done by different parties. If the policy is evaluated it should be evaluated in a holistic way, including the input, output and outcome of the policy as to improve the implementation of effective changes (Verdung, 2017). The evaluation itself can be done by the policymakers themselves, or if the situation requires elsewise, the evaluation can be done by an independent third party. This form of independent policy evaluation will be preferable to a non-independent form of evaluation, although the latter will most likely be less expensive and less time consuming due to the existing network and expertise in the policy matter (Mickwitz, 2003). The evaluation contributes to the overall learning process (Dinar, 1998) and enables the policy to be subjected to critique, improvement and appreciation at multiple phases in the time scope to which the policy is applied (Müller & Siebenhüner, 2007). Thus, improving the quality and effectiveness of the policy in cycles, naturally increasing the likelihood that the flood risks are managed with success. Monitoring tools have to be in place in order to be able to evaluate the policy. Monitoring enables stakeholders to check if the targets are being met, to observe if the policy is implemented correctly, to see if there are differences visible on a spatial scale and to see if there are differences visible on a time scale (Patterson & Doyle, 2009). Monitoring also enables enforcement and policy compliance,

making sure the policy is being implemented and adhered to (Jaspers, 2003; Gray & Shimshack, 2011; van Rijswijk et al, 2014). Enforcement is incorporated in this policy analysis framework.

Stakeholder engagement

During the last two decades, a lot of emphasis has been put on the idea of public participation (Doelle & Sinclair, 2006; Hartley & Wood, 2005; Palerm, 2000; Shepherd and Bowler, 1997) and more recently stakeholder engagement, the latter being defined as a process wherein stakeholders are having more profound influence in the policy process (OECD, 2015b). Arguments for including stakeholders in the policy process have been abundantly discussed in scientific literature (Glucker et al., 2013). However, these arguments tend to differ per author. While some scientist value the extra (local) knowledge, which stakeholders can insert in the policy process (Lockwood et al. 2010; Pahl-Wostl 2009) increasing the policy's effectiveness, others tend to attain a more normative stance as to why stakeholders must be involved in the policy process (OECD 2015b; Van Rijswick et al. 2014). Although stakeholder engagement can be a time intensive aspect of the policy formulation process, it is known to make the policy implementation process more effective and efficient (Ridder et al., 2005). Increased public support, enforceability and incorporation of local knowledge which enables tailor made, fit for purpose policy can all be attained is stakeholder engagements is included in the policy process (European Commission, 2016). In order to clarify this concept of stakeholder engagement, this study differentiates between different levels of stakeholder interaction. Stakeholder interaction can take place on three different levels, each level representing a different level of engagement and therefore a different level of stakeholder influence (OECD, 2015b; Koop et al., 2017). The first level being information supply, at this level the stakeholder is merely informed and has no opportunity to influence the policy process (OECD, 2015b; Koop et al., 2017). The second level of stakeholder interaction is called stakeholder consultation, at this level stakeholders are informed and have the opportunity to share their knowledge and provide constructive feedback to policy draft plans. Stakeholder consultation is however no guarantee for increased stakeholder influence in the policy process, because there is no obligation for the policymakers that the insights and information gathered trough consultation is integrated in the final policy (OECD, 2015b, p. 37). The last level of stakeholder interaction, active involvement, is the one with the highest level of influence in the policy process. Active involvement provides stakeholders the opportunity to be an integral part of the policy formulation process, thus ensuring stakeholder engagement (OECD, 2015b; Koop et al., 2017). Because of the described benefits of stakeholder engagement and the relative ease to assess this criterion, it will function as an assessment criterion of this policy analysis framework.

Long-term funding

Flood risk is a long-term problem and therefore requires a long-term solution. This solution has to be translated in to a long-term policy in order to effectively solve this issue of flooding (OECD 2015c). The phenomenon of climate change forces policy makers to incorporate a longer time span in their policies due to the nature of this conundrum and its correlation with increased flood risk. Because flooding will increase in frequency and magnitude, flood risk policy has to incorporate a broader time frame in order for cities to enjoy a continuous responsiveness towards flood events. Flood risk policies with a broader time scope can therefore facilitate increased adaptability to flood risk which enables cities to effectively manage flood risk (Lockwood et al. 2010). A long term scope however has to be accompanied by a form of financial continuation in order for the realization of the long term plans formulated in flood risk policies (Adger et al., 2005; Geels, 2013). Long-term funding is crucial for the implementation, evaluation and adaptation of flood risk policies. Thus, long-term funding enables the continuation of policy throughout a long time span, naturally having an impact on the policy's effectiveness. The time scope and the extent of the financial continuation embedded in certain flood risk policies are therefore merged in to the selected evaluation criteria Long-term funding.

Clear goals supported by intermitting targets

Policies which have clear goals which are in turn supported by intermitting target are naturally more receptive to monitoring and can enjoy a higher quality of evaluation (Müller & Siebenhüner, 2007). Policies which have formulated clear goals and intermitting targets can take advantage of their ability to be enforced adequately. If intermitting targets are not met or are believed to be not met according to the monitoring tools, enforcement can be done at different stages in the implementation process. Setting clear targets in flood risk policy can help to identify crucial actors and processes involved with attaining the target at an early stage, thus enabling targeted enforcement throughout the implementation phase (Bäckstrand, 2006). The formulation of clear goals can therefore contribute to effective implementation due to the improved compliance, brought about by the ability to enforce more effectively (Jaspers, 2003; Gray & Shimshack, 2011). Clear goals also strengthen the policy as a whole. A policy, being an effective way of addressing and solving a certain complex problem, cannot be effective without a problem analysis and a clear objective (Bäckstrand, 2006). By having clear goals and intermitting targets a policy can continuously reassess its function, its progress and its societal value. Finally, flood risk policies should integrate long-term goals due to the nature of the problem of flood risk, and long-term goals have a higher chance of being achieved if they are supported by intermitting goals (OECD 2011; OECD 2015a; Brown and Farrelly 2009; Corfee-Morlot et al. 2009; Lockwood et al. 2010; OECD 2011; OECD 2015a; Head and Alford 2013; Van Rijswick et al. 2014).

Clear division of responsibilities and enforcement

According to many authors, having a clear division of responsibilities is essential in addressing complex water challenges such as flood risk (e.g. Armitage 2005; Folke et al. 2005; Pahl-Wostl et al. 2007; Ribeiro et al. 2009). Flood risk policies are inherently part of a multi-level governance process, and the allocation of clear responsibilities between different actors at different levels is crucial in attaining effective policy (Mickwitz et al., 2009; Biesbroek et al., 2010). Unclear division of responsibilities can complicate the implementation of policies, by fostering conflicting incentives and competition for resources between actors and sectors (Biesbroek et al., 2010, p. 446). Clear division of responsibilities also enables targeted enforcement if needed. If responsible actors/parties do not meet up to their responsibilities, enforcement is crucial in order to incite the expected compliance (Gray & Shimshack, 2011). Enforcement tools and capabilities must therefore be integrated in flood risk policy in order to foster a timely implementation of the policy. Enforcement is likely to promote compliance because actors will be aware of the consequences of non-compliance and are therefore more likely to comply throughout the implementation phase and if actors are not complying to the agreements or targets set in the flood risk policy, they can be forced to comply by using various enforcement mechanisms (Jaspers, 2003; Biesbroek et al., 2010; van Rijswijk et al, 2014). Although there are more compliance mechanisms available, such as economic stimuli and tax benefits (Barde & Opschoor, 1994) these will be of smaller importance in flood risk policies compared to enforcement due to the nature of flood risk policy and its association with the field of emergency planning, risk management and safety. Higher level policy such as EU policies or national policies require enforcement to ensure adequate ratification. These policies tend to direct and dictate certain changes, which is why it is important to implement requirements to obey. Furthermore, the literature has shown that communicative and financial tools have to be supported by enforcement tools in order to achieve ultimate effectiveness (Citeren). Because of the latter reasons i chose to focus solely on enforcement as a compliance mechanism.

3.1.2. Supranational Policy frame of the European Union

The importance of E.U. principles

The importance of the European Union (EU) principles

In order to understand the process of supranational or EU policy making, one needs to become familiar with some of its most fundamental principles. In this section I will briefly discuss the subsidiary principle, the proportionality principle and the conferral principle.

The subsidiary principle is the principle which aims to keep the legislative and executive power of the European Union in check, by not allowing the EU to action if it is more effective to take action taken at a local or national level. Furthermore, it aims to ensure that decisions are made with the smallest political distance to the citizen as possible. (Treaty on European Union, 2007, article 5.3; EUR-Lex, 2017). By having this consistent power check in place, sovereign states are less wary of losing sovereign power because of EU involvement, thus increasing political willingness to adhere to and implement policies made by this supranational body. Protocol No 2 annexed in the Treaty of Lisbon forces the European Commission to evaluate the regional and local implications of each legal document draft and provide an argumentation as to why the subsidiary principle is not breached. If the principle is not respected, national parliaments can object to such a draft so that the proposal must be reviewed, amended, withdrawn or blocked. Regarding flood risk policies, sometimes, depending on the measures which are being implemented, national or local level action can be more effective. Thus minimizing the legislative and executive power of the EU, forcing its institutions to formulate less mandating policies regarding flood risk.

The proportionality principle is closely related to the subsidiary principle. It also aims to reduce and check the power of the European Union. This rule prohibits the EU to take more action than what is needed in order to achieve the objective of a certain treaty (Treaty on European Union, 2007, article 5.4). Thus, ensuring that the form and content of actions taken by the EU are within specific boundaries and in coherence with an aimed pursued (EUR-Lex, 2017). This second principle also promotes subsidiaries to have a proactive approach towards the EU and has the beneficial effect that sovereign states feel less threatened in their sovereignty. Regarding flood risk policies it could be argued that the aim of reducing flood risk and reducing casualties and damage related to flooding may be exempt of this principle, in order for these policies to implement maximum action and to ensure optimal impact.

The Conferral principle is also a fundamental principle which limits the power of the EU (EUR-Lex, 2017). According to this principle the EU can only act within the limits of the competences that have been assigned to the EU by the EU treaties, which have been agreed upon and signed by the member states themselves (Treaty on European Union, 2007, article 5.2). This principle ensures the member states that the supranational entity is only governing complex issues and tasks that have been conferred to it by the member states themselves. By conferring these competences to the EU in order to obtain shared objectives the member states created an entity which is aimed at serving its subsidiaries instead of harming national interests. This principle therefore enables the member states to have a hospitable stance towards the EU instead of a hostile one. Flood risk policies are related to two different competence groups, namely shared competences; e.g. environment and supporting competences; e.g. civil protection (Treaty on the Functioning of the EU, 2001, Articles 2-6; EUR-lex, 2016). Shared competences are areas wherein EU countries can exercise their own legislation and policy if the EU does not already exercise or has chosen not to exercise its legislation and policies (Treaty on the Functioning of the EU, 2001, Articles 2-6; EUR-lex, 2016). Supporting competences are areas wherein the EU can only coordinate, support or complement the action of E.U. countries (Treaty on the Functioning of the EU, 2001, Articles 2-6; EUR-lex, 2016). Because flood risk policy is partially divided between these two more democratic competences groups, the mandating powers of these policies are reduced. Also, the level of variability in the implementation after the ratification is enhanced because of this position between competence groups. This would not have been the case if

these flood risk policies fell under the exclusive competences group of the EU, in which solely the EU is able to legislate, adopt and implement binding acts. These exclusive areas, such as, the customs union, monetary policy and rules for competition in the internal market enjoy higher levels of policy standardization (vertical coherence between the EU and members states) and effective implementation throughout the EU countries (Woolcock, 2010, p 24.).

All three principles were seemingly needed to be embedded in the EU, before its members could and would agree upon the Treaty on the European Union (Treaty on European Union, 2007). This treaty established the basis of EU law, EU principles and the governance structure of this supranational entity's institutions. It is one of EU primary treaties. These principles have two main functions, their first function is to control the power of the EU institutions and their second function is to set clear boundaries for that power. These three principles naturally have an impact on the policies produced by the EU. These policies have to abide by the same principles which sometimes diminish their clarity, weaken their legislative power and reduce their overall effectiveness. The process of ratification, which will be more thoroughly discussed in the following sections, also has an impact on the formulation and implementation of EU policies.

The EU Water Framework Directive 2000.

If a policy is adequately addressing one of the indicators, as described in the previous chapter, it will result in a positive score (+). If a policy is addressing an indicator, sufficiently, resulting in sub-optimal results, the indicator will receive a neutral score (0). When there is no mentioning of the indicator in the policy, it will receive a negative score (-). When the policy does not address the indicator sufficiently, according to their definitions in this research, it will also receive a negative score.

Table 1. Summary evaluation European policy frame.

Indicators	European Water Framework Directive (2000)	European Flood Directive (2007)
1. Dealing with uncertainty	0	+
2. Policy evaluation	+	+
3. Stakeholder engagement	+	0
4. Long-term funding	0	0
5. Clear goals supported by intermittent targets	+	+
6. Clear division of responsibilities and enforcement	+	-

The EU Water Framework Directive (EU WFD) has been one of the most studied European document showing up 193.000 results in Google Scholar alone and has been praised for being effective and having impact even though it covers many subjects (Hering et al., 2010), ranging from water quality to flood defense (European Commission, 2016; Kallis & Butler, 2001; Moss, 2008). The EU WFD has been introduced in the year 2000 and its goal is to improve water quality in all European waters and to have these waters achieve and maintain good ecological status by 2015 (Tsakiris et al., 2009; Newig, 2014). The EU WFD strives to be a comprehensive instrument to govern water quality, and flooding is seen as a potentially polluting event, which explains why it is being addressed in the EU WFD as the

EU Flood Directive enacted in 2007. In Article 1, the purpose of the legislation is set out, and article 1(e) aims to mitigate the effects of flooding at a river basins scale, making this the first pan-European legislation which aims to manage flood risks. Member states are given the right to heavily modify water bodies if it has the capacity of reducing flood risks. Although the EU WFD was an environmental directive, the EU Flood Directive has a broader focus, incorporating human health, cultural heritage and the economy as well as the environment (The EU Flood Directive, 2007).

Uncertainty (Ind. 1, Table 1) in relation to flood risk is only being addressed by attaining a river basin management approach, fostering a more comprehensive flood risk management method. This approach reduces the amount of uncertain factors related to flooding by increasing the spatial scale and thus covering more geographic factors contributing to flood risk. Monitoring is an integral part of the EU WFD, with respect to monitoring groundwater and surface water quantity and quality (European Commission, 2000). The European commission has implemented a six-yearly evaluation cycle in the form of commission reports, which include a review of progress made in the implementation of this directive. Also conferences are convened in line with the reporting cycle with representatives of each member state and NGOs, academia, economic partners and consumer bodies to comment on these reports and to share experiences to promote learning (European Commission, 2000, L327/19 (18)).

Evaluation (Ind. 2) is therefore also an integral part of the EU WFD. Stakeholder engagement is ensured by this directive because it stresses the importance of including representatives of NGOs, social and economic partners, consumer bodies and the epistemological community. Moreover, stakeholder engagement (Ind. 3) is ensured by this directive because of the public participation standard embedded in this directive (European Commission, 2000, L327/5 (46)). The WFD governs a time span of 27 years. A policy which is active for almost three decades and is aimed to fulfill its 27 yearlong objective cannot be criticized for having a short-term scope, however long-term funding (Ind 4.) is addressed suboptimal. The directive only states that it will not prevent the funding of measures needed in order to comply with the directive (European Commission, 2000, L 327/13 (3)).

The EU WFD has clear goals (Ind. 5) and deadlines for its intermitting targets. These are depicted in the table 2. The responsibilities (Ind. 6) in this document are clearly allocated to the level of the member states (European Commission, 2000, p.3 (13). They are responsible for complying with the policy. The directive tries to integrate enforcement measures, by stating that "*It is necessary to ensure the proper application of the provisions implementing this Directive throughout the Community by appropriate penalties provided for in Member States' legislation. Such penalties should be effective, proportionate and dissuasive*" (European Commission, 2000, L327/5 (53)). Member states should therefore adopt legislation which can penalize non-compliance with the EU WFD, which is a clever measure which enables enforcement of this policy. Albeit being a form of indirect enforcement at the EU level, member states are required to enforce this policy at the national level.

Table 2. Overview of deadlines targets in EU WFD (European Commission, 2016).

Date	Issue	Reference
2000	Directive entered into force	Art. 25
2003	Transposition in national legislation Identification of River Basin Districts and Authorities	Art. 23 Art. 3
2004	Characterisation of river basin: pressures, impacts and economic analysis	Art. 5

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2006	Establishment of monitoring network Start public consultation (at the latest)	Art. 8 Art. 14
2008	Present draft river basin management plan	Art. 13
2009	Finalize river basin management plan including programme of measures	Art. 13 & 11
2010	Introduce pricing policies	Art. 9
2012	Make operational programmes of measures	Art. 11
2015	Meet environmental objectives First management cycle ends Second river basin management plan & first flood risk management plan.	Art. 4
2021	Second management cycle ends	Art. 4 & 13
2027	Third management cycle ends, final deadline for meeting objectives	Art. 4 & 13

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The EU Flood Directive

The EU Flood Directive (EU FD) 2007 is also a comprehensive legal document which aims to reduce the damage done by flood in the whole of the European Union. Flood risk management has a history of being very technical in nature. Technical flood defense works, such as the building of dams, channels and reservoirs, have been a measure favoured by central governments worldwide. The traditional safety measure such as dams and levees have ironically contributed to the accumulation of infrastructure, housing and wealth in areas which are naturally prone to flooding (Hartmann, 2009). Thus, the creation of these technical safety measures has adversely increased the overall flood risk, e.g. the number of people, infrastructure and property in an area prone to flooding. This traditional approach is being challenged by the EU FD 2007, which puts more emphasis on the management of risks and adapting societies to cope with flooding. Begum and van Gelder (2004) coincide the term “living with Flooding’ which applies to this new approach being promoted and mandated by the EU FD 2007. Other authors have also addressed this change in discourse, rightfully addressing that spatial planning is more suited on localized level and that the policies underlying spatial planning are best formulated and implemented at the local level (Bergsma, 2016). These policies require local knowledge in order to be effective due to the unique (geographic and socio-economic) characteristics of spatial zones. This shift in flood risk governance away from the adoption of technical safety measure, which are typically governed and funded by a centralised government, towards more spatial planning measures, which require more decentralised governance structures and new funding schemes, corresponds with a wider shift in discourse, which some scholars identify as the shift towards a more neoliberal perspective (Krieger, 2012; O’malley, 2012; Ericson et al., 2003). The EU FD 2007 mandates its member states to produce: a) a preliminary flood risk assessment, b) flood hazard and risk maps, c) flood risk management plans, in this exact order. These products have different objectives (European Commission, 2007). The preliminary flood risk assessment strives to identify the potential areas which are at risk. The flood hazard and risk maps aim to provide more detail in the exact social, economic and environmental damages flood events can bring about in a certain area, helping communities prioritize and justify certain measures. The flood risk maps also aim to increase (local) public awareness on the water challenges. The flood risk management plans entail the measures which reduce flood risk in the river basin. However, the primary focus of these plans are

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on prevention and preparedness whereas protection is mostly addressed in the implementation of non-technical measures such as the designation of emergency floodplains, implementing restrictions on urban development in areas prone to flooding and giving rivers more space to alleviate peak discharges. The flood risk management plans are based upon the preliminary flood risk assessment and the flood hazard a risk maps. These plans are also the only operational instrument of the EU Flood Directive. The other products are merely informative documents which identify flood risk and specify the impact in certain areas and try to communicate these risks to the public, private and societal actors (European Commission, 2007; Newig et al., 2014). Wording and formulation of content has been done with care and precision as to not put off member states and to uphold the subsidiary, proportionality and the conferral principle. However, there is a clear distinction between the applied wording and formulation in the EU WFD and the EU FD, the latter being more open to interpretation and less mandating. Wording such as; 'in developing policies referring to water and land uses Member States and the Community should consider the potential impacts that such policies have on flood risk and the management of flood risk' (European Commission, 2007, p.2 (9)) leave open a lot of room for member states to interpret the document and implement different measures in order to comply with this document. Regional and local authorities are given the most responsibility due to the belief that flooding cannot be managed at a national level since they occur at a local level with different impacts in different regions and local knowledge is needed to solve the issue (European Commission, 2007). In doing so the EU upholds the subsidiary principle as well as the proportionality principle.

Uncertainty (Ind. 1, Table 1)) is partially being taken into account by demanding the member states to take into account the likely impact of climate change into the proposed plans and documents which have to be created in accordance with the EU FD (European Commission, 2007, p. 7 (14, 16)). The second way the directive deals with uncertainty is by improving the ability of states to predict flood events by mandating the formulations of Flood risk assessment and Flood maps. However, by choosing this approach, monitoring, evaluation (Ind. 2) and assessment methods are hardly applicable to these locally formulated heterogeneous policies. Making the policy hard to revise and improve if needed. The character of this EU FD can therefore be described as being more guiding in nature then the EU WFD which had enjoyed more mandating power. Although the directive has incorporated a six year review cycle of the Preliminary Flood risk assessment, the flood risk maps and the flood management plans, it does not say how these should be assessed or which criteria should apply for assessing these documents (European Commission, 2007, p. 7 (14)). It does say that states have to make an assessment of the progress made towards the achievement of the objectives listed in the directive, a description or explanation for the proposed measures which have not been met and a description of any additional measures undertaken by the state.

Stakeholder engagement (Ind. 3) is realized to some extent by informing local stakeholders of the flood risks through these flood maps (European Commission, 2007, p. 2). Also by incorporating necessary local knowledge in the formulation of the flood risk maps, a form of consultation takes place. Lastly, article 10 of the EU FD requires member states to encourage active involvement of interested parties in the production, updating and reviewing of the flood management plans. The time scope present in this directive is not one which can be described as promoting and or enabling a long-term strategy or vision. There is not a clear delineation of the end period, only stating that the member states are obliged to update the required plans and documents every six years.

The funding (Ind. 4) is secured through the obligation national member states have to implement this policy. There are however no specific financial arrangements or monetary obligations mentioned in the directive. The goals (Ind. 5) this directive tries to obtain are very clear, namely the creation of these products, and are strengthened by intermittent targets which have a clear deadline (European Commission, 2007, p. 4, 7). The responsibilities (Ind. 6) are clearly allocated to the member states, although there are no clear enforcement tools described which can be used in order to promote compliance and ensure that responsibilities are being adhered to by the member states. There is only a form of progress monitoring embedded in this directive (European Commission, 2007, p. 7, (15)), which is not supported by other compliance mechanisms.

Table 3 Overview of deadlines targets in EU FD (European Commission, 2016).

Date	Issue	Reference
26.11.2007	Entry into force	Art 18
26.11.2009	Transposition	Art 17
22.12.2009	Reporting format Preliminary Flood Risk Assessment	Art 11
26.5.2010	Administrative arrangements to be in place and to be notified to the Commission	Art 3
22.12.2010	Cut-off date transitional measure (availability of existing tools)	Art 13
22.12.2011	Preliminary flood risk assessment	Art 4 & 5
22.12.2012	Public participation process starts (publication of mechanism and timetable for consultation)	Art 9.3 & 10
22.12.2013	Flood hazard and risk maps	Art 6
22.12.2015	Flood risk management plans	Art 7
22.12.2018	2nd Preliminary Flood Risk Assessment, specific requirement on climate change Commission's first implementation report due.	Art 14.1 & 4
22.12.2019	2nd Flood hazard and risk maps	Art 14.2
22.12.2021	End of 1st flood risk management cycle 2nd Flood Risk Management Plans, specific requirement on climate change. 3rd Water Framework Directive River Basin Management Plans.	Art 14.3 & 4

3.1.3. The National Policy frame United Kingdom:

The United Kingdom has policies and legislation in place for flood protection, after the Pitt review was published in 2007 (Pitt, 2007). Following the great summer floods in the United Kingdom, a renewed sense of urgency and emphasis on flood risk management occurred throughout the United Kingdom (LFRMS, 2016). The policies imposed on the United Kingdom have an European, national and local origin. As is common within a supranational law and policy arena, sovereign countries have to adopt legislation and policy through the ratification process.

Table 4. Summary evaluation National policy frame United Kingdom.

Indicators	Flood risk regulations (2009)	Flood and Water Management Act (2010)	National Policy Framework (2012)
1. Dealing with uncertainty	+	+	+
2. Policy evaluation	+	+	0
3. Stakeholder engagement	0	-	+
4. Long-term funding	0	0	0
5. Clear goals supported by intermittent targets	+	0	+
6. Clear division of responsibilities and enforcement	-	+	+

Flood Risk Regulations 2009

The Flood Risk Regulations are the product of the ratification process of the EU FD in the United Kingdom and will therefore be shortly addressed in order to avoid repetition. The Flood Risk Regulation requires the Environment Agency (EA) and Lead Local Flood Authorities (LLFA) to create preliminary flood risk assessments; to prepare flood risk maps and flood hazard maps and to produce flood risk management plans. LLFA are either the unitary authority for the area or council of a county or area (Flood Risk Regulations, 2009; The Flood and Water Management Act, 2010 p 4). The EU FD required countries and local governments to create these flood risk management instruments. All of these product will be reviewed, and if necessary, revised by the EA and LLFA creating form of multi-level policy evaluation (Flood Risk Regulations, 2009 p 3,5,6,10). Lastly, all policy reviews must be carried out in six-year cycles or less. By ensuring this form of policy evaluation and possible adaptation of the policy, uncertainty is addressed to some extent. Similar as the EU FD, the Flood Risk Regulation deals with uncertainty (Ind. 1; Table 4) by mandating both the EA and the LLFA to take climate change into account when producing the flood risk documents. Climate change also has to be taken in to account every six years in evaluation process thus enabling the continuous adaptation of flood risk policy (Ind. 2; Flood Risk Regulations, 2009 p 4, 10). Regarding clear goals and intermitting targets (Ind. 5), the Flood Risk Regulation aims to produce these flood risk maps, flood risk management plans and preliminary flood risk assessments and has set intermittent targets to ensure the right implementation of these products. The first flood risk assessment report had to be delivered before 22 December 2011 and the first review has to be done before 22 December 2017 (Flood Risk Regulations, 2009 p 3). The first flood risk map and flood hazard map had to be completed before 22 December 2013 and its first review must be carried out before 22 December 2019 (Flood Risk Regulations, 2009 p 6). The first flood risk management plans had to be created before 22 December 2015 and the first review must be completed before 22 December 2021 (Flood Risk Regulations, 2009 p 10). Stakeholder engagement (Ind. 3) is ensured to the same extent as is done in the EU FD. These regulations envision a long-term strategy, as does the EU FD. The extent of financial continuation (Ind. 4) is also not clearly formulated in this directive. A Clear division of responsibilities (Ind. 6) is visible in the regulations; the EA and the LLFA are responsible for the creation of the flood risk maps and strategies. The implementation of these documents in flood risk management is also a responsibility of the two actors.

The Flood and Water Management Act 2010

The Flood and Water Management Act (FWMA) 2010 is a result of strategy documents published by the government of the United Kingdom and has incorporated flood management strategies and feedback expressed in the Pitt review (2007). The Act is aimed at minimizing damage done by floods and is a representation of the shift in framing of the issue of flooding from a flood defence policy approach to a flood risk management approach (Bergsma, 2016; Butler & Pidgeon, 2011). In this

legislation responsibilities are being allocated to different actors, including private actors such as citizens (Butler & Pidgeon, 2011). In these respects, the FWMA follows up on the new policy discourse set by the EU FD. The FWMA has some adaptive components which enables it to deal with uncertainty to a certain extent. Article 28 of the FWMA states that the secretary of state has the power to amend acts which are older than the FWMA, but who have a certain effect on the implementation of the act itself. These acts, such as the Land Drainage Act 1991, the Water Resource Act 1991 and the Environment Act 1995, are all relevant to water governance (Flood and Water Management Act, 2010, p 20). By exerting the power to amend these acts, the FWMA can whenever necessary, become more effective by altering the existing legislative framework. This strengthens the adaptive capacity of this act and enables it to deal with possible uncertainties in the near future. Through the FWMA, the secretary of state has gained the power to transfer responsibilities of authorities in relation to flood risk. This ability to transfer responsibilities and to restructure the policy arena also enables the FWMA to adapt to new and unforeseen situations. Lastly, in the formulation of national flood and coastal erosion strategies, obligated by the act, the uncertainties (Ind. 1; Table 4) of climate change have to be taken in to account (Flood and Water Management Act, 2010 p 5).

Monitoring of national and local flood risk strategies is made mandatory by this act (Flood and Water Management Act, 2010 p 5, 7). The strategies produced as a result of this act also have to incorporate reviews, and have to state when and how this is going to take place (Flood and Water Management Act, 2010 p 5, 7). The local food risk management strategies created by the local authorities first have to be submitted in a draft to the EA. The EA can then approve the strategy, approve it with adjustments or they can reject the strategy, thus performing a form of ex ante policy evaluation (Ind. 2). The EA is also obliged by the FWMA to report to the secretary of state on the progress and implementation of the national and local strategies, the minister may decide to make regulation as to ensure reports are handed in on a regular basis (Flood and Water Management Act, 2010 p 13). LLFA have duty to report on flood events and have to report on the exercises of the RMA in relation to the flood event (Flood and Water Management Act, 2010 p 14). The formation of regional flood and coastal committees is instructed by this act. The secretary of state can make provisions on the selection and appointment of members and the number of members of each committee.

Stakeholder engagement (Ind. 3) is solely addressed in the FWMA by obligating the EA to hold a consultation with regional flood and coastal committees on how the implementation of flood risk strategies will impact the committees region. According to the act, the strategies may not be implemented without consent of these committees. Funding (Ind. 4) of these strategies and the implementation of flood risk management can be secured by means of a grant system. As the FWMA instructs: "*The EA may make grants in respect of expenditure incurred or expected to be incurred in connection with flood or coastal erosion risk management in England*", thus enabling financial continuation regarding flood risk policy implementation in England (Flood and Water Management Act, 2010 p 13). Furthermore, in both the national flood risk management strategy and the local flood risk strategy, which are to be created, have to elaborate on the cost and benefits of the measures implemented by these respective strategies and describe how they are to be paid for (Flood and Water Management Act, 2010 p 6). Thus, enabling the formulation and incorporation of long-term funding schemes in these strategies but not ensuring the allocation of funding themselves.

The goal (Ind. 5) set by this directive is not very clearly formulated but they are in line with the flood risk regulations of 2009, namely reducing flood risk. The intermittent targets, which are not only the formulation and implementation of the flood risk strategies but also, encompass a restructuring of the governance arena, which is done by assigning new responsibilities to new authorities.

The responsibilities (Ind. 6) are clearly allocated to a set of so called risk management authorities. These allocations are done per region or area as to facilitate good flood risk governance at the local level. These risk management authorities (RMA) are the EA, an Internal Drainage Board, The highway authority, a water company and a lead local flood authority. Depending on the area, all can differ, except the EA, which is the top tier governance actor and ensures the vertical implementation of national strategies. The EA and the LLFA have a monitoring role but also a mandating one in this

governance arena constituted out of RMAs. The EA and the LLFA may, in some cases, order work to be carried out by one of the other authorities (Flood and Water Management Act, 2010 p25). It should be specified clearly in the strategy which RMA manages which flood risk management functions (Flood and Water Management Act, 2010 p 5). Enforcement is done via so called civil sanctions. Knowledge and especially local knowledge is crucial in formulating the strategies which are initiated by the Flood Risk Regulations and the Flood and Water Management Act. For example, civil sanctions can be laid upon persons who do not provide the specified information after the authority has given an enforcement notice. The time in order for the authority to receive the information must be at least 28 days before the RMA can impose a penalty. This penalty can amount to 1350$ (Flood and Water Management Act, 2010 p 12). Persons may also not alter any flood risk structure, measure or feature without consent of the responsible authority. Persons in violation can also be given a enforcement notice and if persons fail to comply with the steps dictated in the notice, a person is required to pay for expenses (Flood and Water Management Act, 2010 p 38).

National Planning Policy Framework 2012

The National Planning Policy Framework (NPPF) was published in 2012 and is the national framework for planning policies in relation to development and/or construction works. It governs the whole planning domain and dedicates a section to flood risk. The NPPF tries to strengthen flood risk governance by formulating planning policy which limits the big impact infrastructure development has on increasing the risk of floods. The policy also incorporates planning measures and restriction in order to minimize flood risk in the United Kingdom (UK).

This policy deals with uncertainty (Ind. 1; Table 4) by seeking alternative locations for existing developments where climate change is expected to increase flood risk in the future, which are expected to become less habitable. Also the NPPF requires local planning authorities to draw up a local plan (NPPF, p37). The local plans should address the impact that socio-economic and environmental change has on the spatial dimension which the plan governs. Climate change adaptation and mitigation, including flood risk management should be given a strategic priority in these local plans (NPPF, p38). By doing so the NPPF aims to address uncertainty.

However, there are no evaluative guidelines or review procedures availability to evaluate the NPPF. The lack of policy evaluation (Ind. 2) limits the ability of the NPPF to respond to new or changing challenges that naturally emerge when policy has to deal with a considerable amount of uncertainty. Although there are no guidelines for the evaluation or review of the policy itself, monitoring and review of the local plans is promoted by the NPPF by providing free advice as to when and why local plans should be updated (NPPF, p 49).

Stakeholder engagement (Ind. 3) is being addressed in this policy as pre-application engagement. The policy is directing local planning authorities to alert stakeholders of new development plans and to include them as much as possible in this pre application stage. According to this policy, early engagement of stakeholder in the application process of development plans can save public and private resources and at the same time improve the outcome for the community (NPPF, p 45). Local authorities cannot oblige developers to engage with all local stakeholder before applying their plan because of lacking legislative measures, but they are encouraged via consultation to include extra stakeholders, if this is thought to improve the overall efficiency of the application process (NPPF, p 45). Because the planning authority aims to encourage stakeholder to engage with development plans in the pre-application phase, this indirectly encourages developers to engage with the community and other stakeholder before submitting their plan to the planning authority (NPPF, p 45). The more barriers and problems which can be resolved at this early phase the more resources can be saved and the more likely the application plan is to be implemented effectively (e.g. Ridder et al. 2005). This form of engagement consist out of consultation rounds, discussion sessions after which, if necessary the plan can be adapted (NPPF, p 45).

The preferred time span of these local plans is set at 15 years in this policy (NPPF, p 38). Funding (Ind. 4) in relation to the implementation of flood risk measures is not incorporated in this policy, probably because is a responsibility of the developer. The goals (Ind. 5) set in this policy in relation to flood risk are, avoiding development away from high flood risk areas and if development in flood risk areas is mandatory for economic reasons, adaptation measures are incorporated in the development plans as to not increase flood risk elsewhere (NPPF, p 23). This policy has more measures to realize these goals, namely, the application of the sequential test, a test which is based on strategic flood risk assessment which helps to avoid development in flood risk areas (NPPF, p 23). Land which is crucial for present and future flood risk management should be protected from any further development (NPPF, p 23). Furthermore, the application of the exception test should ensure that if development in deemed necessary for socio-economic reasons, that this does not result in increased flood risk elsewhere (NPPF, p 23). There are however no intermittent targets, aside from the formulation and implementation of the local plan by each local authority, which governs flood risk management in planning and development.

Responsibilities (Ind. 6) are allocated to three actors, namely, the local planning authority, developers, and to some extent the local stakeholders (NPPF, p 37, 45, 46, 47). These responsibilities are clear. Enforcement can be done by the local planning authority in the following way, if a plan does not take in to account the NPPF and the mandatory flood risk assessment it is needed to be revised. By not approving of these development plans which lack strategic flood risk assessment, the authority can force compliance to the NPPF. Also local planning authorities are instructed to create a enforcement plan, in which it becomes clear how they will monitor the implementation of all the flood risk measures and when and how they will deal with non-compliance (NPPF, p 47).

3.1.4. Regional Policy frame Milton Keynes

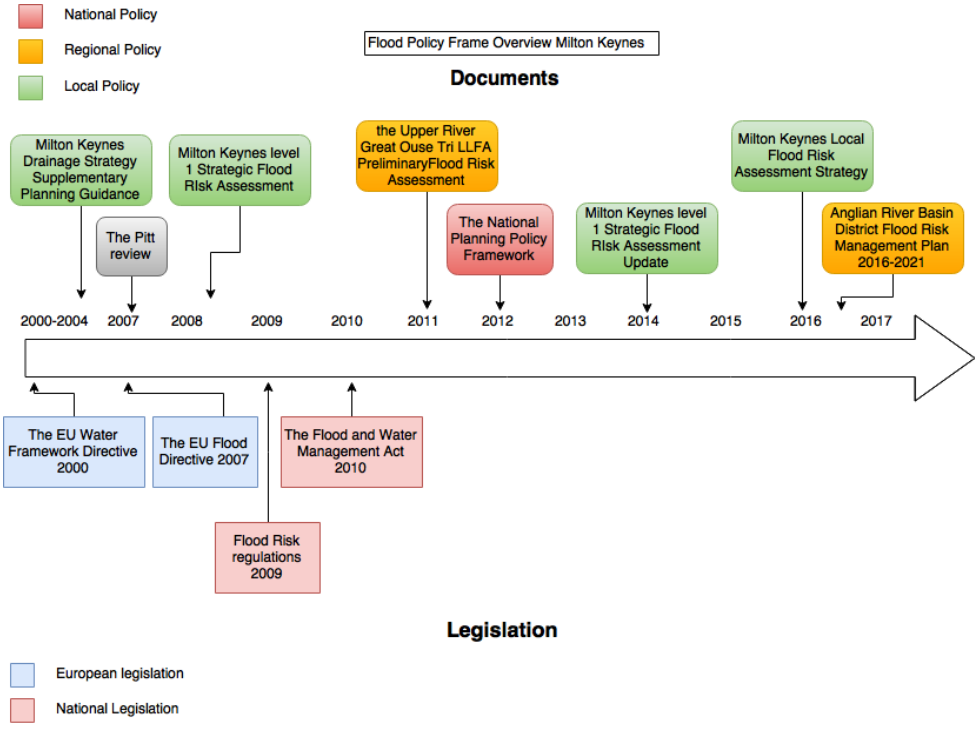

Figure 3. Chronological overview of Flood risk management legislation and policies of Milton Keynes.

Table 5 Summary evaluation Regional policy frame Milton Keynes.

Indicators	The Upper River Great Ouse Tri Lead Local Flood Authority Preliminary Flood Risk Assessment (2011)	Anglian River Basin District Management Plan (2016)
1. Dealing with uncertainty	+	+
2. Policy evaluation	+	+
3. Stakeholder engagement	+	+
4. Long-term funding	-	0
5. Clear goals supported by intermittent targets	0	+
6. Clear division of responsibilities and enforcement	0	+

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Upper River Great Ouse Tri Lead Local Flood Authority Preliminary Flood Risk Assessment (2011).

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The preliminary flood risk assessment was published in 2011 and was created for the Bedford Borough Council, Central Bedfordshire Council and Milton Keynes Council. The document aims to assist these councils with fulfilling their tasks, set in the flood risk regulations. This document transcends the political boundaries of each neighboring council and enables coordinated action to take place on a catchment level (PFRA, 2011). The creation of a preliminary flood risk assessment (PFRA) is a necessary step in order to meet the requirements set in the flood risk regulations, which mandate the creation of PFRAs by each lead local flood risk authority (Flood Risk Regulations, 2009). This document provides an preliminary overview of potent flood risks stemming from local sources, excluding main rivers and reservoirs and is a screening exercise in order to map out areas which experience the most significant flood risk (PFRA, 2011, p 2). There was no local information available on future flooding and this uncertainty (Ind. 1, Table 5) was being addressed by assessing possible future impacts of flooding for the local area and by creating the flood maps. The latter were produced by the Environment Agency and served as the main source of information for this assessment (PFRA, 2011, p 17). Climate change is addressed in this policy as is the uncertainty related predicting climate change impact at the local level. The PFRA is taking climate change in to account in its policy and tries to adapt to increased rainfall and heavy storms (PFRA, 2011, p 17). The documents stresses the need for more local research on how climate change and land use can impact flood risk in these areas. The document will examine many different measures and maintain a flexible nature needed to adapt to future uncertainties (PFRA, 2011, p 18).

The Flood Risk Regulation (2009) requires the PFRA to be reviewed every six years. The review will be done by the local authority which checks if the PFRA meets quality standards, afterwards the Environment Agency will review the policy on a technical level after which the PFRA is presented to the regional flood and coastal committee (RFCC) (PFRA, 2011, p 35). The RFCC will then scrutinize the PFRA and if the document is approved of it is submitted to the European commission and taken in to effect (PFRA, 2011, p 36). Policy evaluation (Ind. 2) mechanisms are in place and adequate.

The Bedford Group of Drainage Boards has produced the document in partnership with the Environment Agency, Anglian Water Service and the Lead Local Flood Authorities, namely the councils (PFRA, 2011, p 5). Local knowledge is crucial in order to be able to get a clear overview of the flood risks, which the PFRA has to present. More than 20 local and national information sources were consulted in order to acquire the data and information needed to produce the PFRA (PFRA,

2011, p 9). This process of information gathering combined with the cooperation on the formulation of the PFRA with relevant risk management authorities ensures a form of stakeholder engagement (Ind. 3). Funding (Ind. 4) was not mentioned in this document. The relevance of long-term planning however was addressed (PFRA, 2011, p 18).

Clear goals (Ind. 5) are formulated in this document in regards to the assessment of flood risks and the communication of these findings in the form of a report which has to be published in a six year cycle. It also functions as a framework to which the sequential and exemption test for future development plans can be applied to. The responsibilities addressed in this document are a reflection of the responsibilities allocated to the RMAs in the Flood and Water Management Act (2010) and the Flood Risk Regulations (2009). However, the responsibilities (Ind. 6) in relation to flood risks and the actions needed to be taken by each actor is less elaborated on in regards to other documents, only the responsibilities of the Lead Local Flood Authority are extensively discussed (PFRA, 2011, p 18). These include the investigation of flood events and maintaining a list of structures which are thought to have an impact on flood risk and the formulation of a local flood risk management plan (PFRA, 2011, p 18). This document lacks the specification of compliance mechanisms such as enforcement.

Anglian River Basin District Management Plan (2016)

The Anglian River Basin District Management Plan is a flood risk management plan. These plans describe all the possible sources of flood risk, including rivers, surface water, reservoirs and groundwater. Flood Risk Management Plans (FRMPs) elaborates on how risk management authorities will govern and manage flood risk for a period of six years. According to the EU Flood directive 2007, each EU member state was obligated to produce and implement these plans. These FRMPs needed to have a river basin approach in order to be effective. A river basin district is a relatively large area which has one or more river catchments (ARBDMP, 2016, p 1). The Anglian river basin district has eleven different catchments, including the Upper and Bedford Ouse, in which the city of Milton Keynes is located. In the FRMPs the highest priority is given to measures which reduce the risk to life (ARBDMP, 2016, p 5).

Uncertainty (Ind. 1, Table 5) is addressed to a certain extent by insisting that in planning, a variety of scenarios have to be considered in order to understand the possible impacts coupled to certain long-term decisions (ARBDMP, 2016, p 39). The plan also acknowledges the fact that it is impossible to precisely predict the extent to which climate change will impact flood risk and when and where flood events will take place (ARBDMP, 2016, p 39). By realizing that uncertainty is a characteristic of flood risk the plan has formulated measures which try to address this uncertainty by enabling some goals and measures to be flexible in nature.

Policy evaluation (Ind. 2) has been addressed in the FRMP because it is subjected to a six year evaluation cycle, wherein the implementation of the measures is being monitored and reviews on the overall progress are published (ARBDMP, 2016, 29). It is important to note that these evaluation measure stem from the Flood Directive and the Flood Risk Regulations. However, the RMA have to monitor and report annually to the Regional Flood and Coastal Committees on the implementation of the measures, which is a instructed as an extra evaluation measure by the plan itself (ARBDMP, 2016, p 85).

Stakeholder engagement (Ind. 3) has taken place in the formulation phase of this document. The plans have been created by risk management authorities, especially by the Environment Agency, the Lead Local Flood Authorities (ARBDMP, 2016, 25). Existing knowledge and documents were used to construct this plan and the sharing of information in these partnerships has enabled the formulation of this plan. The Environment Agency, who officially published the plan, has not only consulted and engaged with the other RMA for the formulation of this plan, but also shared a draft version with Milton Keynes city council, the lead local flood authority and Anglian Water. In this way they are given the opportunity to provide feedback before the draft was disclosed for public consultation (ARBDMP, 2016, 26). This public consultation took place from October 2014 until March 2015 and made it

necessary to update the draft version, making the final product a result of stakeholder engagement (ARBDMP, 2016, 26).

Long-term funding (Ind. 4) is not assured for the entire plan. Not all the measures formulized in the plan have acquired funding and there is no guarantee that these will be implemented (ARBDMP, 2016, p 5). According to the plan, funding is done 'in line with government policy and priorities' (ARBDMP, 2016, p 85). The government policy however has been subjected to austerity measures and currently dictate Risk Management Authorities measures to seek other funding sources for the implementation of flood risk proposed measures in this plan (ARBDMP, 2016, p 33).

The goals (Ind. 5) are sorted in four categories, namely preventing risk, preparing for risk, protecting from risk and recovery and review of risk. Recovery and review of risk has one measure allocated to attaining the one goal allocated to this category. All of the other three categories each have five goals linked to them. The category protection from risk has 11 measures allocated to achieve its five goals, preparing for risk nine measures and preventing risk has 17 measures planned in order to attain its goals (ARBDMP, 2016, p127, p128). The goals which are formulated are therefore supported by targets and or measures.

The plan also adheres to the same risk management authorities as previous documents being, the Environment Agency, Lead Local Flood Authority, a Water company, Internal Drainage Boards and Highways England (ARBDMP, 2016, p 17). The responsibilities (Ind. 6) are clearly allocated and made visible in Table 4. The enforcement actions and powers are however not described in detail in this plan and is discussed in the most general way. Enforcement, however, can be done by the Environment Agency, namely by obligating landowners to take measures to limit flood risk of the overall area. The Lead Local Flood Authority, Milton Keynes Council, enjoys the same enforcement powers as the Environment Agency. The Bedford Group of Drainage Boards can undertake action in order to keep access to alongside water courses, enabling them to remove human made objects or natural objects in order to be able to do drainage works.

Table 6. Responsibilities allocated to the RMAs as formulated in the ARBDMP 2016.

Environment Agency	**Milton Keynes Council**	**Anglian Water**	**Bedford Group of Drainage Boards**	**High Ways Agency**
Permissive powers to manage flood risk from 'main rivers', the sea and reservoirs.	Permissive powers to manage flood risk from surface water, 'ordinary watercourses' (non-main rivers) outside of internal drainage districts, and groundwater. LLFAs also manage the drainage on the majority of local highways.	Manage the sewerage and water supply networks and any flood risk arising from them. Also manage flood risk to any critical infrastructure, such as water treatment plants and pumping stations.	Permissive powers to manage water levels within their respective drainage districts. IDBs undertake works to reduce flood risk to people and property and manage water levels to meet local needs.	Highways England looks after the motorways and major A roads focussing on the most important national routes.

The Milton Keynes Drainage Strategy Guidance (2004) and the Milton Keynes Local Flood Risk Management Strategy (2016), are the most important local policies ensure adequate flood risk governance in Milton Keynes. These two policies are not discussed in to detail in this section because they are part of the data necessary for analyzing the governance capacity of the city.

3.1.5. National Policy frame of the Netherlands

Table 8. Summary evaluation National policy frame the Netherlands

Indicators	Delta Programme (2017)	The National Water Plan 2016- 2021 (2015)
1. Dealing with uncertainty	+	+
2. Policy evaluation	+	+
3. Stakeholder engagement	+	+
4. Long-term funding	+	+
5. Clear goals supported by intermittent targets	+	+
6. Clear division of responsibilities and enforcement	+	+

According to the Water wet (2017), the Dutch water law, the government is mandated to have a delta program (Waterwet, 2017, art 4.9) and the Delta wet mandates the implementation of the Deltaprogram and ensures its long term funding via the Delta fund (Delta wet, 2011, art 3). The Water law also obligates the formulation of the main outline of the government's water policy in national water plans (Waterwet, 2017, art 4.1). The Delta Programme and the National Water Plan form the foundation of the Dutch flood risk management and encompass most water safety measures, which justifies this selection of both policies.

Delta program (2017):

The Delta program is a policy of the Dutch government to protect the Netherlands against flooding as a result of climate change. Although the main focus is on flood protection, freshwater supply is also addressed in this policy. The program came in-to being in 2010 and in 2011 the Delta law ensured that the program has to be updated every year.

The Delta program adheres to different delta scenarios, which are plausible future outcomes on climate and socio economic developments, in order to deal with uncertainty (Ind. 1 Table 9). Preferable strategies outlined in the program take in-to account these different scenarios in order to be adaptive in nature (Delta programma, 2017, p 6). The program has ordered an independent inquiry in to the consequences which the projected climate change impacts would have on these delta scenarios. The projected impacts made by the IPCC, corresponded with climate change impact vested in the existing delta scenarios (Delta programma, 2017, p 7). In 2019, the newest scientific insights in to climate change will be validated and the Delta Program will evaluate if it needs to adjust its strategies to these new findings (Delta programma, 2017, p 7). This program therefore shows an enormous capacity for adaptive management and is likely to result in the increased effectiveness of the policy.

Policy evaluation (Ind. 2) is strongly embedded in the Delta program. The program is updated every year and submitted to the parliament. The parliament can scrutinize the program and instruct certain

adjustments to be made. As discussed, independent policy evaluation is applied to the program by Dutch research institutes (Delta programma, 2017, p 7). This independent policy evaluation combined with the yearly update of the program and consecutive review by the government ensures ample evaluation of the policy. A system in in place throughout the whole policy, which is called "*meten, weten, handelen"* wherein the policy output is being monitored, the process of realizing the outcome is assessed and improvements points are mentioned. This approach ensures the monitoring of the implementation and extent to which the policy goals are being attained.

Stakeholder engagement (Ind. 3) is being addressed in multiple ways. A knowledge portal is created to facilitate the sharing and coproduction of knowledge by different organizations, including stakeholder organizations, NGOs, knowledge institutes, water boards and business in order to produce the best possible knowledge based flood defense policy. Regional governmental bodies, such as water boards, provinces and municipalities all have to incorporate the measures set in this program in to their own policies. Via a shared problem approach all responsible authorities have worked together since the formulation of the Delta program. Stakeholder engagement is done via a form of good communication, consultation and active involvement.

Financial continuation of this policy is being provided for by the Delta fonds, or Delta fund. The Delta fund ensures financial funding of most national flood defence policies until 2030. In the period of 2017-2030 around €16,3 billion is available which is around €1,2 billion each year (Delta programma, 2016, p 92). Around 800 million is reserved for possible budgetary set back or unexpected cost, increasing the feasibility of this long-term funding (Ind. 4).

The goals set in this policy are clearly formulated (Ind. 5) at a project level and have a planned schedule attached to them allowing the monitoring of the implementation process (Delta programma, 2017, p 88). The High Water Protection Programme (Hoogwaterbeschermingsprogramma) is the implementation program of the Delta program, which specifies each project, the responsible authority, the length in metres and a time span of five years (Hoogwaterbescrermingsprogramma, 2017). If all projects are finished within the targeted period, the overall goal of achieving long-term water safety in the Netherlands is considered achieved.

The Dutch government is responsible (Ind.6) for the implementation of this policy, more specifically the Rijkswaterstaat, which is the executive body of the ministry of infrastructure and the environment. Regional authorities such as waterbodies and provinces have to implement the policy and can be held accountable if they are not meeting implementation targets. Furthermore, the responsibilities are clearly formulated at a project level in the The High Water Protection Programme (HWPP). Because of the vertical nature of this policy, progress of regional and local projects can be monitored and the responsible authorities for the implementation on the regional and or local scale have to comply with this programme due to legislative obligations set in the *Water wet* and *Delta wet* (Delta programma, 2017, p 8). As discussed earlier, the shared problem approach also makes the implementation of the policy a shared endeavor, based on mutual trust. Although compliance is secured through legislation, there are is no mentioning of hard enforcement techniques; rather other softer compliance techniques, such as mutual trust and the shared problem approach, are addressed.

The national water plan 2016-2021 (2015).

The National Water plan 2016-2021, is the second version of the national water plan (2009) of the Netherlands and it describes the principles and the main goals for the period of five years with a long-term vision which stretches out until 2050. It aims to enable the creation of a resilient water system in the Netherlands, which is flood proof, minimizes water shortages and ensures a healthy ecosystem and good water quality. These are according to the water plan crucial for prosperity. With this policy the Dutch government strives to comply to all European guidelines and directives concerning water quality and flood risk management, mainly the EU WFD and the EU FD (Nationaal Waterplan, 2015, p.7). This plan also complements the Delta Program and this combined approach gives the Netherlands a leader status worldwide if it comes to water management. The National Water Plan

(NWP) upholds a pro reactive stance towards climate change and the expected long-term impacts it has (Nationaal waterplan, 2015, p 5).

The water problems are addressed via a catchments approach, which is promoted by the EU WFD and EU FD which minimizes the uncertainties (ind. 1 Table 9) related to a complicated issue such as flooding, improving flood risk management opportunities (Nationaal waterplan, 2015, p 9). The NWP has incorporated the latest climate change scenarios made available by the royal Dutch metrological institute, and these scenarios form the basis of this policy's measures (Nationaal water plan, 2015, p 9). The policy focuses on having an adaptive approach which consist out of phased decision making, flexible strategies and as previously discussed an integral method. In this way, uncertainties are dealt with sufficiently.

Policy evaluation (Ind. 2) is done via a yearly public consultation on the achievements of the NWP in relation to its proposed schedule (Nationaal waterplan, 2015, p 10). Stakeholder engagement (Ind. 3) is present in this policy in multiple ways. First, the water boards and the executive body of the ministry of infrastructure and environment (Rijkswaterstaat), have had the opportunity to be actively involved by expressing their advice and by providing feedback on the draft version of this NWP. The feedback has been processed in the concept version and both stakeholders have stated that they were content with the consultation process (Nationaal waterplan, 2015, p 10). Afterwards on a regional level the concept was discussed in sessions including municipalities and provincial bodies. Lastly, societal stakeholder organizations had the opportunity to meet with the ministry of infrastructure and environment on the final version of this NWP. All relevant stakeholders have been addressed and could exert different levels of stakeholder engagement.

Long-term funding (Ind. 4) has been ensured via the The High Water Protection Programme (HWPP). The HWBP is an external part of the Delta fund, but is financed separately, excluding it from the water safety budget (Delta programma, 2017; Nationaal Waterplan, 2016). There is 3.8 billion euros available for the implementation of the HWBP for the period of 2016 until 2028 (Delta programma, 2016, p 92).

The NWP has clear goals with intermittent targets (Ind.5) which have to be implemented in a realistic time frame of five years. The main aim of this policy in relation to water safety is, to ensure that the chance that someone in the Netherlands dies as a result of flooding may not exceed 0,001% per year (Nationaal water plan, 2015, p 15). This is realized by improving the safety norms for dikes even further. A risk based approach, as dictated by the EU FD, ensures even higher protection of areas which have large population numbers, high economic damage or crucial infrastructure. Water safety also can be improved by widening rivers, creating flood barriers, using sand to strengthen dunes and by applying a smart combination of these measures (Nationaal water plan, 2015, p 15).

Similarly to the Delta Program, the Dutch government, water boards and provincial bodies are responsible (Ind. 6) for the implementation of this policy by attaining the same shared problem and shared responsibility approach present in the Delta program. Compliance mechanism, other than legislative obligations is less elaborated upon. There is no mentioning of Enforcement.

3.1. 6. The regional policy frame of Rotterdam

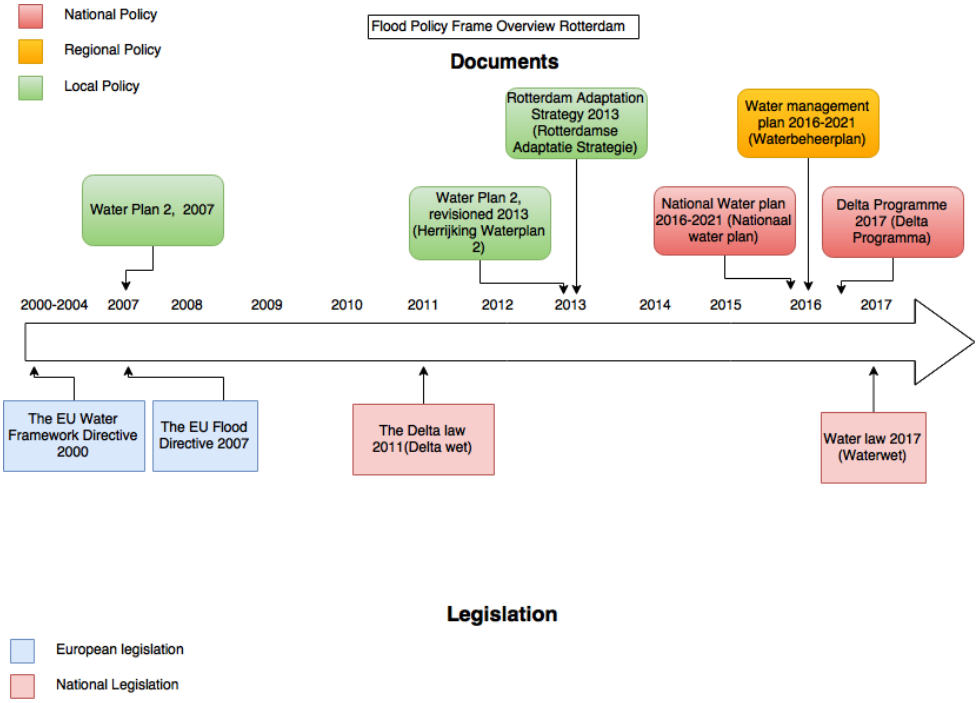

Figure 4. Chronological overview of Flood risk management legislation and policies of Rotterdam.

The Rotterdam Adaptation Strategy and the Waterplan 2 revised, are the two most relevant and comprehensive flood risk management policies of the city of Rotterdam. Both policies are formulated in such a way that they complement each other and enable cooperative policy implementation. This also fosters effective co partnership funding schemes. They are not assessed in the policy frame in to detail because they are an important part of the governance capacity analysis.

Table 9. Summary evaluation National policy frame the Netherlands

Indicators	Water management plan (2016)
1. Dealing with uncertainty	0
2. Policy evaluation	+
3. Stakeholder engagement	+
4. Long-term funding	+
5. Clear goals supported by intermittent targets	+
6. Clear division of responsibilities and enforcement	+

Water management plan (2016)

The water management plan is a policy produced by the water boards in order to meet the obligations set in the national water plan and the delta plan and aims to implement these on the regional scale. Therefore this policy will be discussed rather briefly.

The plan acknowledges the uncertainties related to climate change and its impact on flood risk (Waterbeheerplan, 2016, p 12), they also anticipate on future changes and by implementing the new (mandated) norms for dikes the policy tries to deal with uncertainty. The policy is unable to formulate other concrete measures as how to deal with these uncertainties in relation to flood risk.

Policy evaluation is done by incorporating planning and control mechanism in the policy which ensures adequate monitoring of progress and enables improvements to be done if necessary (Waterbeheerplan, 2016, p 20). The effectiveness of dike reinforcements can be monitored and assessed by means of laser-altimetry and the actual state of dikes is being monitored by inspectors on a regular basis (Waterbeheerplan, 2016, p 29)

The policy stresses the importance of early stakeholder engagement and consultation as a factor for successful policy implementation by adopting an ambition to include stakeholders at the early stage in the decision-making process (Waterbeheerplan, 2016, p 31, 87)

Financial continuation is ensured by raising water board levies by 2,5% between 2016 and 2021 (Waterbeheerplan, 2016, p 82). This increased income ensures the implementation of flood risk measures. For some big project the policy can use budgets available in the delta fund (Waterbeheerplan, 2016).

The water management plan (WMP) has clear goals, namely it wants to improve water safety by improving dike structures and to ensure continuous maintenance for dikes and levees (Waterbeheerplan, 2016, p 20). These goals are supported by intermitting targets, which are depicted in an implementation schedule, some of which correspond with the targets set in the high water protection program embedded in the delta program (Deltaprogamma, 2016).

Responsibilities in the WMP correspond with those in the delta program. The water boards are responsible for the implementation of the new norms in relation to dike safety, and in this policy they clearly attain the level of responsibility necessary to comply with national policy (Waterbeheerplan, 2016, p 42, 86). In this policy the responsibilities of civilians and companies are also addressed, albeit less clear (Waterbeheerplan, 2016, p 19). This policy enables enforcement if noncompliance of actors leads to obstruction to perform tasks, but clear instructions and examples enforcement tools are not mentioned in to detail (Waterbeheerplan, 2016, p 19).

3.2. Governance capacity analysis

3.2.1 Governance capacity analysis of Milton Keynes

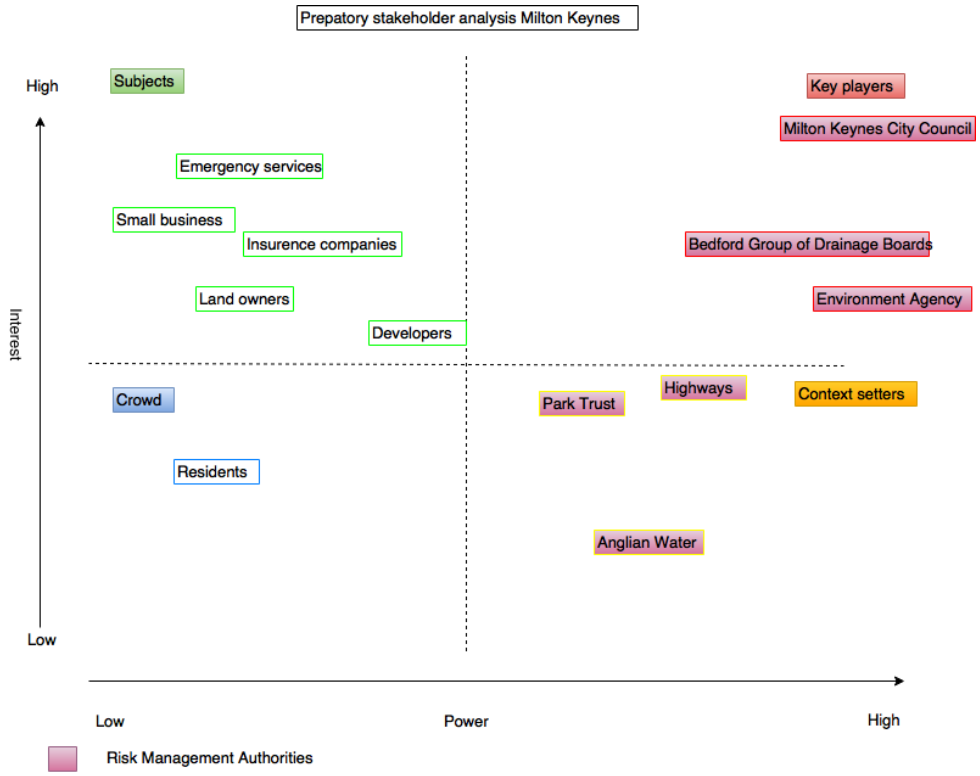

Figure 5. Preparatory stakeholder analysis of Milton Keynes

In order to identify the relevant stakeholders necessary for applying the GFC, a preparatory stakeholder analysis was needed to ben conducted. National and regional policies were assessed (Flood and Water Management Act, 2010; National Planning Policy Framework; 2012) and literature sources (Butler & Pidgeon, 2011; Boholm et al., 2012) were used to create this stakeholder analysis. Because this research focusses on governance capacities, key players and context setters, because of their governing and influential role in the decision making process, became the stakeholders which were most important to interview. In this stakeholder analysis of Milton Keynes, interviews were conducted with experts from the Bedford Group of Drainage Boards, the Park Trust, Highways, the planning department and emergency department of Milton Keynes, Milton Keynes City Council and a parish council member which represented the residents. Also a person from Cranfield University was interviewed in order to include objective scientific insights even though this knowledge institute is no direct stakeholder.

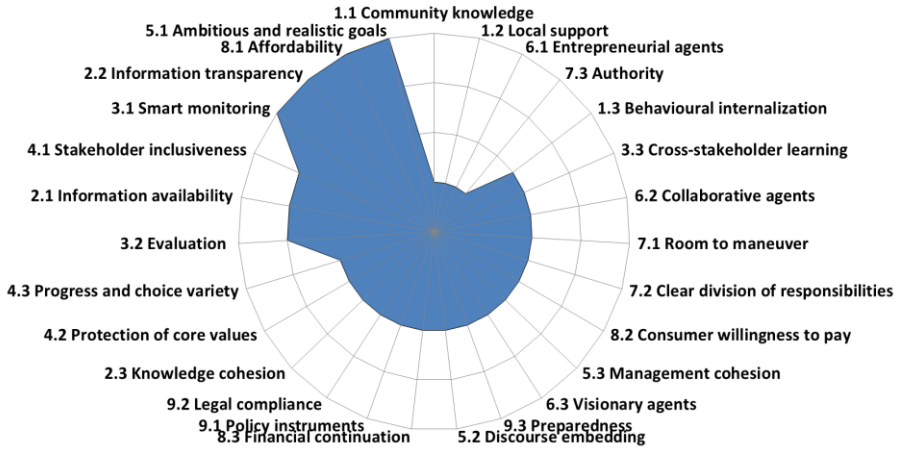

Figure 6. The governance capacity analysis of Milton Keynes

Table 11. Summary evaluation governance capacity analysis of Milton Keynes.

Condition 1: Awareness		Final score
Indicator 1.1: Community knowledge	-	- Insufficient
Indicator 1.2: Local sense of urgency	-	
Indicator 1.3: Behavioral internalization	0	
Condition: 2 Useful knowledge		Final score
Indicator 2.1: Information availability	+	+ Positive
Indicator 2.2: Information transparency	++	
Indicator 2.3: Knowledge cohesion	0	
Condition 3: Continuous learning		Final score
Indicator 3.1: Smart monitoring	0	0 Neutral
Indicator 3.2: Evaluation	+	
Indicator 3.3: Cross-stakeholder learning	0	
Condition 4: Stakeholder engagement process		Final score
Indicator 4.1: Stakeholder inclusiveness	+	0 Neutral
Indicator 4.2: Protection of core values	0	
Indicator 4.3: Progress and variety of options	0	
Condition 5: Management Ambitions		Final score
Indicator 5.1: Ambitious and realistic management	++	0 Neutral
Indicator 5.2: Discourse embedding	0	
Indicator 5.3: Management cohesion	0	
Condition 6: Agents of change		Final score
Indicator 6.1: Entrepreneurial agents	-	0 Neutral
Indicator 6.2: Collaborative agents	0	
Indicator 6.3: Visionary agents	0	
Condition 7: Multi-level network potential		Final score
Indicator 7.1: Room to manoeuver	0	0 Neutral
Indicator 7.2: Clear division of responsibilities	0	
Indicator 7.3: Authority	-	

Condition 8: Financial viability		Final score
Indicator 8.1: Affordability	++	0 Neutral
Indicator 8.2: Consumer willingness to pay	0	
Indicator 8.3: Financial continuation	0	
Condition 9: Implementing capacity		Final score
Indicator 9.1: Policy instruments	0	0 Neutral
Indicator 9.2: Statutory compliance	0	
Indicator 9.3: Preparedness	0	

Condition 1: Awareness

Indicator 1.1: Community knowledge

The amount of knowledge regarding current and future risk related to flooding, which is dispersed throughout the community is rather fragmented in Milton Keynes. It was found out that community understanding of flood risk issues is limited (SR001; SR002; SR003; SR004; SR005; SR006 and SR007). Only neighbourhoods which have experienced regular flooding such as Stony Stratford recognize the risks (SR001; SR004 and SR006). Areas that have been flooded in the past and have a collective memory are more keen to get involved in the decision making process (SR00 and SR003). Local stakeholders have been involved in the policy process of the local flood risk policy. The policy draft underwent a period of public consultation, in which local stakeholders such as businesses and citizens could give feedback on the drafts. After this consultation, the strategy incorporated the feedback and comments in the final version which was published and adopted in 2016 *Local Flood Risk Management Strategy of Milton Keynes* (LFRMS, 2016, p 8). The issue is being addressed at the local governmental level because it is a legal obligations within the policy ratification processes (European Flood Directive, 2007; Flood Risk Regulations, 2009), not because the local community is actively aware of and involved with flood risk. Due to the limited understanding of the flood risk in the community and the reticence expressed by the local government to address this issue, the community knowledge indicator is scored as limiting (-) the overall governance capacity.

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1.2. Local sense of urgency

The citizens who are most prone to flood risk express their concerns but due to the design of the city and its drainage capacity, the general public does not recognize these concerns due to their relative low exposure to flood risk (SR001; SR002 and SR006). Flood risk adaptation measure have been implemented in the spatial planning policies (LFRMS, 2016), but fail to be an item on the political agenda during elections. There is a lack of general awareness and there are no signs of widely supported actions that mitigate flood risk in Milton Keynes (SR001; SR003 and SR007). There are local policies addressing flood risk, but these are the product of legal obligations rather than the result of a forward looking approach of the city council (SR002; Flood Risk Regulations, 2009; Flood and Water Management Act, 2010). Because flood risk is not an item on the political agenda and due to the general lack of awareness, this local sense of urgency indicator is found to be limiting (-) the overall governance capacity.

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1.3 Behavioural internalization

Milton Keynes exposure to flood risk is relatively low for the new neighbourhoods but the older, lower areas of the city have a higher flood risk (SR001). People living in these older parts do understand the impact of flood risk and try to change their behaviour. These local communities have worked together with the council in order to become more adaptive to flood events, by implementing flood risk measures in their property using door walls and airbricks (SR002 and SR003). One interviewee noted that a local community had used local funding in order to purchase a flood risk barrier which could be assembled in times of increased flood risk (SR003). Although some local stakeholders due change their behaviour, the local government recognizes the problem due to legal obligations and national pressure. Therefore flood conscious behavioural internalization is considered to have an indifferent (0) impact on the overall governance capacity to address flood risk.

Condition: 2 Useful knowledge

2.1 Information availability

Information availability regarding flood risk is not an issue; there are large quantities of qualitative studies available who use different methods and models to predict flood risk (SR003; SR004 and SR005). During the last years flood maps have been improved by the Environment Agency and many stakeholders depend on these information sources in order to make decisions regarding the water challenge (SR004; SR005 and SR007). Local authorities have to produce flood risk assessments in order to fill in knowledge gaps and uncertainty regarding flood risk at the local level (Flood Risk Regulations, 2009). Climate change models and national flood maps cannot accurately predict the impact and actual risk of current and future flood events on a local scale and these risk assessment are means to complement existing information regarding the water challenge. Indicator 2.1: Information availability is however, considered to be encouraging (+) the overall governance capacity, due to this recent development of informative flood documents.

2.2 Information transparency

Information on flood risk has become more accessible for local stakeholders. On governmental websites interested stakeholders can see current flood warnings and real-time river and sea levels (https://www.gov.uk/check-flood-risk). It is also possible to view the risk of flooding of local areas for a period of five days in the future, even long-term risk of flooding can be viewed in the flood maps of the Environment agency. Lastly, a free service has been made available which enables local stakeholders to receive a warning if their house or business is likely to be flooded within a certain timeframe (https://www.gov.uk/sign-up-for-flood-warnings). People can subscribe to this service and will be warned via email or telephone. Technical information regarding flood risk is translated in order to make it more understandable for non-experts (SR003). Flood maps are for example a visual expression of flood risk in the form of a geographic map in order to for people to better understand the risks (SR005). Due to these tools the information on flood risk is easy to access and to understand, resulting in a very encouraging (++) score for indicator 2.2: Information transparency.

2.3 Knowledge cohesion

The risk management authorities all have different responsibilities and produce specific knowledge in order to fulfil their individual responsibilities. The Environment Agency is responsible for producing information needed to create flood maps, the Milton Keynes council has to report on the occurrence of flood events (SR006), in turn the drainage board is tasked with draining water ways in order to maintain their respective drainage capacities and studies the river levels and discharge rates (SR005). The planning department is tasked with ensuring the realization of future developments needed to meet the increasing demand for future urban development, and the Highways are tasked with ensuring good traffic flow and focus on researching and developing better drainage systems (SR004). Although all stakeholders use different methods in order to produce knowledge on flood risk, there is a lack of knowledge coproduction and using integrated knowledge in order to create sustainable long-term flood risk policies (SR003). Different stakeholders and organizations focus on their specific issues and objectives according to their defined responsibilities resulting in sometimes fragmented and overlapping activities. Therefore, the overall cohesion sectors and actors is insufficient. Hence, the score for indicator 2.3: Knowledge cohesion is considered to be indifferent (0) for the overall governance capacity to address flood risk.

Condition 3: Continuous learning

3.1 Smart monitoring

The monitoring of river levels, their discharge rate and drainage capacities is done by the Environment Agency and the drainage board helps to recognize alarming situations (SR005). The drainage system of the city is monitored at a regular basis and technical improvements are made if deemed necessary (SR007). The city council has to report on flood events and communicate the findings with the Environment Agency so that they can improve their flood maps (LFRMS, 2016). The overall monitoring

regarding flood risk is adequate and helps to predict alarming situations, leading to a score of 0 for indicator 3.1 smart monitoring.

3.2 Evaluation

The local policy recognizes the importance of new technologies and monitoring techniques in order to continue to be able to predict flood events in the future (LFRMS, 2016, p 38). The policy document itself is viewed as being a 'living document', meaning it will be continuously updated to newly found information. In this way the document becomes a policy which fosters adaptive flood risk management (LFRMS, 2016, p 38).

Evaluation of the strategy will be done annually or after a significant flood event has occurred and the report will be made visible on the Milton Keynes Council website (LFRMS, 2016, p 53). A complete update of the strategy is planned in 2020 and from that point in time the updates will take place every five years, according to the policy (LFRMS, 2016, p 53). Because the document aims to be a 'live' document, it may require to be reviewed more often due to the adaptations made to its contents. Policy evaluation is therefore sufficiently addressed in the strategy in order to improve the level of learning, leading to an encouraging (+) score for indicator 3.2: Evaluation.

3.3 Cross-stakeholder learning

Cross-stakeholder interaction will foster a form of innovative cross-stakeholder learning, which could produce essential knowledge, necessary for implementing adequate flood risk management solutions. All risk management authorities, which are relevant stakeholders with respect to Milton Keynes' flood risk management, are free to interact with one another. Some meetings take place between the different authorities but they are merely used to inform one another of their responsibilities and the individual progress made in water management projects and drainage maintenance (SR002; SR004; SR005 and SR006). Although the opportunities to interact are available for the stakeholders, cross stakeholder learning and joined policy implementation is suboptimal. Indicator 3.3: Cross-stakeholder learning therefore has an indifferent (0) impact on the overall governance capacity.

Condition 4: Stakeholder engagement process

4.1 Stakeholder inclusiveness

Stakeholders were being actively involved in flood risk management projects of the Park Trust and Highways. People from the parish councils were consulted on the plans and projects of both organizations and active involvement was being promoted (SR001). People were able to speak on behalf of a group and could provide feedback on existing plans. However, if people had comments or feedback on policy decisions they were being told that they would have to consult with the town council on issues relating to flood risk policy (SR001). Although organizations have to abide by legal planning regulations, stakeholder engagement is included in every project (SR004). In these workshops and sessions, stakeholders have the opportunity to express their concerns regarding flood risk management and provide feedback on draft plans (SR002; SR004 and SR005). Stakeholders also work closely with the Environment Agency to make sure that flood risk management measures are in line with national standards (SR004). According to the local strategy, a community engagement exercise took place in which parish councils members were enabled to influence and help mold the draft and its priorities (LFRMS, 2016, p 53). Following this form of stakeholder engagement this draft underwent a period of public consultation, in which local stakeholders such as businesses and citizens could give feedback on the draft. After this consultation, the strategy incorporated the feedback and comments in the final version which was published and adopted in 2016 (LFRMS, 2016, p 8). Stakeholder engagement takes place at the policy and project level, however with various degrees of actual influence, leading to an encouraging (+) score for indicator 4.1: Stakeholder inclusiveness.

4.2 Protection of core values

The community tends to be informed or consulted on most flood risk management projects at an early stage (SR002; SR004; SR005; and SR007) and stakeholders had the opportunity to influence the outcome of the local flood risk policy processes. Local stakeholders and business had the opportunity to give feedback of the draft of the local flood risk strategy when this policy underwent a period of public consultation (LFRMS, 2016, p 8). Due to legislative obligations of the risk management authorities in relation to flood risk governance, sometimes decisions have to comply with the interest of these authorities, minimizing the influence of stakeholder engagement processes. Although stakeholders are consulted, influence of local stakeholders on end results can be limited due to legal obligations of authorities, leading to a neutral indicator score of 0 for indicator 4.2.

4.3 Progress and variety of options

The clear division of tasks for individual stakeholders (LFRMS, 2016) limit the room for the co creation of alternatives. The fact that these divisions in responsibilities are set in legislative documents (Flood and Water Management Act, 2010) does not promote the exploration of active stakeholder engagement. Some actors however have imbedded stakeholder consultation in the implementation process of projects (SR004 and SR007). In workshops and informative meetings, local stakeholders are informed of policy outputs and outcomes and there is room to provide feedback on existing plans (SR002; SR004 and SR007). There are however not well-established procedures or agreements which enable local stakeholders to influence the decision making process. There are no examples given by the interviewees of commitments done with respect to the incorporation of provided feedback in the final projects (SR001; SR002; SR003; SR004; SR005; SR006 and SR007). Although stakeholder consultation takes place as a part of flood risk management projects, end-decisions are made mostly unilateral and room for exploration of alternatives is rather limited and are often not taken into consideration. This results in an indifferent (0) score for indicator 4.3: Progress and variety of options.

Condition 5: Management Ambitions

5.1 Ambitious and realistic management

Most stakeholders agree that the goals are realistic (SR002; SR004; SR005; SR006 and SR007). Many goals set by organizations that have the role of a risk management authority, have doable targets and are supported by stringent agreements to which actors have to adhere (SR003; SR004; SR005 and SR006). In the local flood risk policy, goals are translated in to seven clear objectives and each objective is supported by three or more measures, which are needed to attain the objectives (LFRMS, 2016). These measures include intermitting targets which are all formulized in the strategy action plan, which is basically a planning overview which links a timeframe with deadlines to the measures and objectives set in this strategy (LFRMS, 2016, c1). The extent to which the goals are ambitious is debated upon. While some interviewees describes local policy as ambitious (SR001 and SR007), others actors see room for improving existing policy in order to make it more ambitious (SR005 and SR006). These findings justify a score of very encouraging (++) for indicator 5.1 ambitious and realistic management.

5.2 Discourse embedding

Milton Keynes was designed to be an efficient green city for a quarter million people (SR001) and it continues to be a national frontrunner in issues relating to sustainability (The Guardian, 2016). This green ‘new town’ mentality enables experimentation of new initiatives and fosters implementation of sustainable practices (SR003). However in relation to flood risk management, the low level of urgency and the existence fairly of adequate flood risk management measures diminishes the need for integrated action and innovative policy implementation (SR002; SR003; SR006 and SR007). Therefore indicator 5.2: Discourse embedding is considered to be indifferent (0) for the overall governance capacity to address flood risk issues within the municipality.

5.3 Management cohesion

Water policy in the Milton Keynes and the United Kingdom crosses many different administrative boundaries, this unclear division of responsibilities results in stakeholders shifting responsibilities to

one another which leads to a situation where no considers themselves to be primarily responsible for certain activities leading to passive behaviour (SR004). Due to the administrative boundaries, organizations such as the drainage board cannot attain a catchment based approach (SR005). The local flood risk policy solely focuses waters inside administrative boundaries (LFRMS, 2016), thus the document is also lacking a catchment based approach, which is necessary to adequately address flood risk (European Flood Directive, 2007). As one interviewee effectively put it ' The drainage board and the Environment Agency work on different hydrological sub-catchments level, lead local flood authorities work inside political boundaries. All relevant authorities have their own political drivers and budgets they allocate to flood risk management' (SR005). Efforts are made to try to bring them all together in order to produce consistent flood agendas. However, all actors have different agendas which are a barrier for inter-sectoral cooperation (SR003; SR005 and SR006). Indicator 5.3: Management cohesion therefore is considered to have an indifferent (0) impact on the overall governance capacity.

Condition 6: Agents of change

6.1 Entrepreneurial agents

There is no evidence of small scale pilots being implemented in Milton Keynes aimed at minimizing flood risk other than sustainable urban drainage systems (SR002; LFRMS, 2016). Austerity measures and limited available funding decreases the opportunity of agents of change to gain access to resources (SR001; SR002 and SR003). The fact that only the lower, older parts of the city experience flood risk, create relatively few windows of opportunity for agents to seize. Only one interviewee could give an example of entrepreneurial agents, this was a group of residents who bought their own flood barriers by using local budgets and fundraising (SR002). These findings and the lack of flood risk pilot projects in Milton Keynes results in a limiting score (–) for Indicator 6.1: Entrepreneurial agents.

6.2 Collaborative agents

Actors are able to connect business, government and different sectors in order to deal with the water challenge (SR005). The drainage board, the park trust and the Milton Keynes council are working together to create and maintain Sustainable Urban Drainage Systems (SUDS) and to co-create legal frameworks assigning responsibilities to different SUDS stakeholders (SR006; SR007; LFRMS, 2016, p 10). The current flood risk governance arena, comprised out of the risk management authorities, is being maintained due to national legal requirements (Flood Risk Regulations, 2009; Flood and water management act, 2010). There are no signs which indicate a lack of trust between the different authorities and the Environment Agency (SR004; SR005; SR006). Due to these findings indicator 6.2: Collaborative agents, is found to be indifferent (0) for the overall governance capacity.

6.3 Visionary agents

Although the local policy encompasses a long-term strategy and has a set of short term targets in order to ensure implementation. There are however hardly any visionary agents of change within the governance network of Milton Keynes, nor its communities. The lack of urgency, awareness and the general idea that existing flood risk measures are adequate lay at the heart of this absence of visionary agents (SR001 and SR006). This discrepancy between the long-term policy and the lack of visionary agents, leads to an indifferent (0) score for Indicator 6.3: Visionary agents.

Condition 7: Multi-level network potential

7.1 Room to manoeuvre

All actors in the flood risk governance network of Milton Keynes have specified responsibilities and coupled with predefined tasks (LFRMS, 2016, p 13, 14, 15). This division of tasks and responsibilities is set in legislative documents and therefore creates a rigid actor matrix wherein there is limited room for new, innovative partnerships to develop. Most actors consult experts in their own sector in order to

find solutions to issues related to flood risk management (SR002; SR005 and SR006) although Highways England is currently trying to have a more inter-sectoral approach to the solving the problem of flood risk (SR004). The limited room for actors to develop new dynamic collaboration and the adherence of stakeholders to own traditional fields of expertise justifies an indifferent (0) score for indicator 7.1: Room to manoeuver.

7.2 Clear division of responsibilities

The local policy has formulated the different responsibilities per actor very clearly (LFRMS, 2016, p 13, 14, 15). The allocation of responsibilities is also understood by the actors themselves (SR001; SR002; SR004; SR005 and SR006). However some actors received more responsibilities than others (SR005; LFRMS, 2016). Although the different responsibilities are formulated very clearly, it does however create a highly fragmentized approach to address flood risk (SR007). Actors are accountable for their own predefines tasks and have little incentives to collaborate on the performance of tasks and to seek a more effective way of sharing responsibilities and funds. Different statutory bodies have different responsibilities, which are not, necessarily aligned (SR005) and because of this rigid division of responsibilities, indicator 7.2 is considered to be indifferent (0).

7.3 Authority

According to an employee of the planning department, Milton Keynes council agrees with the notion that flood risk should be solved with an integrated and sustainable approach. However, due to budget constraints and capacity constrains the council does not promote this vision (SR002). Another stakeholder stressed the importance of a proactive role of the council, it being a lead local flood authority, and that the current authority is not fulfilling its potential with respect to enabling and promoting long term integrated solutions to flood risk (SR003). The subject is barely touched upon in the media because of the low sense of urgency. None of the interviewees could give an example of politicians who actively try to push the subject of flood risk on the council's agenda (SR001; SR002; SR003; SR004; SR005; SR006 and SR007). Due to the lack of capacity, budget and interest, indicator 7.3: Authority is found to have a limiting (-) impact on the governance capacity to address flood risk.

Condition 8: Financial viability

8.1 Affordability

Climate adaptation measures are relatively affordable for the citizens of Milton Keynes (SR001; SR002 and SR003). The design of the city and development of the intricate drainage system, including the balancing lakes and the linear parks, meant that the initial investment in flood risk adaptation was high. However because of these initial investments current investments in flood risk adaptation measures are very low and have become very affordable for all citizens (SR001). Community funding can be accessed in order for local stakeholders to implement adaptation measures needed to protect local communities from flood events. The Environment Agency can also help facilitate local stakeholders in the protection of private property from the risks of flooding (SR004). Adaptation measures are also being incorporated in social housing, which can be seen as an act of solidarity (SR003).Climate adaptation is affordable for all and public and private property flood protection mechanisms are in place, which leads to a very encouraging (++) score for indicator 8.1: Affordability.

8.2 Consumer willingness to pay

Local organizations and authorities try to do as much for the taxpayer as possible (SR004). However, there is little knowledge within the community with respect to existing infrastructure that mitigates flood risks (SR002). This discrepancy between expenditure and community understanding of flood risk contribute to a situation where people are only willing to pay for business as usual measures. The trust that the money is well spent by the leading authorities varies per council, in Milton Keynes. However, there are indications that there is sufficient trust regarding flood risk management expenditures (SR003). Due to the sufficient level of trust and the limited awareness and worries regarding flood risk, indicator 8.2: Consumer willingness to pay is considered to have an indifferent (0) impact on governance capacity.

8.3 Financial continuation

Austerity measures and the economic climate have had an impact on the funding structure of the local policy. The central government funding has been reduced and in this strategy, the Lead Local Flood Authority have to fund the flood activities and find new (local) sources to fund the activities outlined in this document. The strategy clearly dictates that Milton Keynes Council should explore all potential funding opportunities for flood risk management and should review these opportunities every half year (LFRMS, 2016, p 38). Long-term funding is therefore not an inherent part of this policy, even though funding is addressed every six months. The construction of big flood defend projects do receive long term funding and existing maintenance related to flood barriers cost are covered by national budget (SR002 and SR003). Financial continuation is very important for the implementation of long term policy, and this is confirmed by stakeholders who enjoy long term funding schemes for the implementation of their policies (SR004; SR005; SR006 and SR007). Recent austerity measures have limited the resources available for flood risk management. Party politics also contribute to the irregularity of flood risk budgets and funding (SR005), which in turn limits the stakeholders' capacity to safeguard long-term policy implementation. The lack of long term financial continuation in the local policy and the irregularity of fund allocation to flood risk justify the indifferent (0) score for indicator 8.3: Financial continuation.

Condition 9: Implementing capacity

9.1 Policy instruments

According to an interviewee, policy instruments can only be applied effectively, if the local council takes interest in the matter of flood risk and in Milton Keynes there is relative little interest in the subject (SR003). Most actors rely on communicative instruments in order to promote compliance. The drainage boards however can apply different enforcement tools, ranging from giving penalties to non-compliers to taking people to court (SR005). Enforcement of planning development regulations regarding flood risk and the implementation of SUDS is done via the project application process. If a project does not comply with the standards and regulations regarding flood risk, the city council can turn down the project application proposal (SR002). There are not many policy instruments used by the authorities in order to change unwanted behaviour in Milton Keynes, due to their relative low interest in the matter. Therefore indicator 9.1: Policy instruments, is scored as being indifferent (0).

9.2 Statutory compliance

Most actors say that they comply with existing regulations (SR002; SR004; SR005 and SR007). Actors have to show that they are complying with existing flood risk regulations when implementing a project and even have to demonstrate how they incorporate flood risk measures in the project (SR004). Legislation can described as being fragmented because of the strict focus on which procedures need to be taken by which actor (SR003). Some plans and strategies have to be created by local authorities by law, but it is not clearly dictated what should be done with these newly formulated plans and strategies (SR003).The lack of a coherent inter-sectoral approach means that there is little coordination between all stakeholders and their respective projects. These strict compliance to fragmented policy and legislation contributes to an indifferent (0) indicator score for statutory compliance.

9.3 Preparedness

Most actors agree on the notion that the city is prepared due to its design and embedded flood risk management measures, policies and action plans are not addressed as being crucial for the cities preparedness (SR001; SR002; SR003; SR005 and SR007). The increasing development and urbanization of Milton Keynes will create issues in the future. The drainage system was designed for a certain capacity and it has long been exceeded because of soaring population numbers (SR005). Increased runoff of due to urbanization will also have a negative effect on existing drainage capacities (SR007). Regarding the clear allocation of responsibilities, one stakeholder said the following: "*The responsibilities still need to be sorted and the structure can be more centralized and integral*" (SR007). The local flood risk policy has clear goals with an implementation schedule (LFRMS, 2016, c1). However actual risks are underestimated and the responsibilities remain somewhat vague. There for this final indicator, indicator 9.3: Preparedness, is considered to be indifferent (0).

3.2.2 Governance capacity analysis of Rotterdam

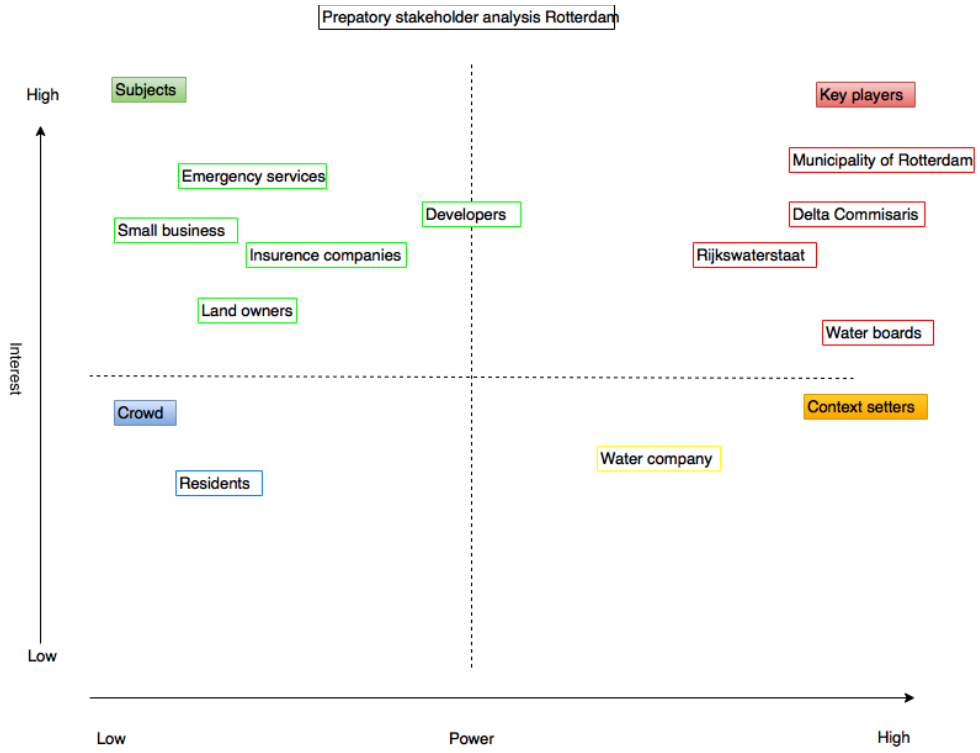

Figure 7. Preparatory stakeholder analysis of Rotterdam

This stakeholder analysis was done in order to identify relevant stakeholders in the governance arena of Rotterdam. National and regional policies were assessed (Nationaal waterplan, 2016; Delta programma, 2017; Water beheerplan, 2016) for the creation of this analysis as well as scientific (Hegger et al., 2014; Ward et al., 2014) and grey literature. For this research on governance capacities, it was important to focus on context setters and key players, because of their governing and influential role in the decision making process. In analysis the capacity of Rotterdam, interviews were conducted with experts from a water company, Rijkswaterstaat, a representative from the Delta commissioner, a water board and different departments within the municipality. A person of the University Of Applied Sciences Of Rotterdam was interviewed in order to gain objective scientific insights, however this institution is not a stakeholder per se.

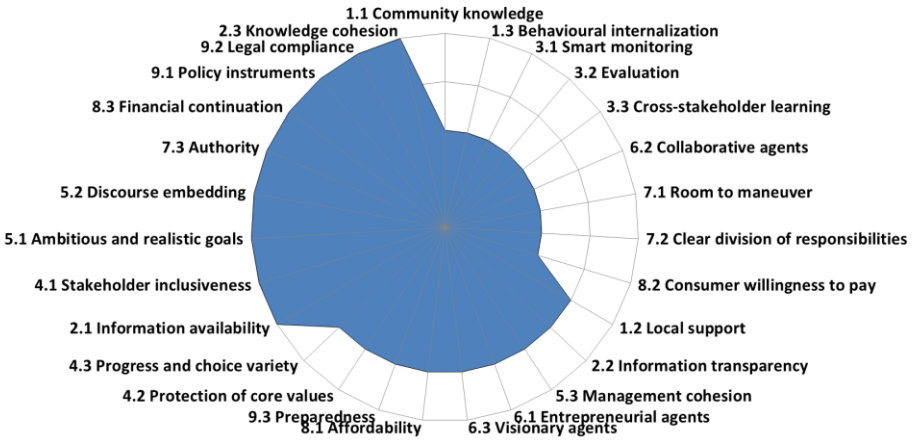

Figure 8. The governance capacity analysis of Rotterdam

Table 11. Summary evaluation governance capacity analysis of Rotterdam.

Condition 1: Awareness		Final score
Indicator 1.1: Community knowledge	0	0
Indicator 1.2: Local sense of urgency	+	Neutral
Indicator 1.3: Behavioral internalization	0	
Condition: 2 Useful knowledge		Final score
Indicator 2.1: Information availability	++	++
Indicator 2.2: Information transparency	+	Very positive
Indicator 2.3: Knowledge cohesion	++	
Condition 3: Continuous learning		Final score
Indicator 3.1: Smart monitoring	0	0
Indicator 3.2: Evaluation	0	Neutral
Indicator 3.3: Cross-stakeholder learning	0	
Condition 4: Stakeholder engagement process		Final score
Indicator 4.1: Stakeholder inclusiveness	++	+
Indicator 4.2: Protection of core values	+	Positive
Indicator 4.3: Progress and variety of options	+	
Condition 5: Management Ambitions		Final score
Indicator 5.1: Ambitious and realistic management	++	++
Indicator 5.2: Discourse embedding	++	Very positive
Indicator 5.3: Management cohesion	+	
Condition 6: Agents of change		Final score
Indicator 6.1: Entrepreneurial agents	+	+
Indicator 6.2: Collaborative agents	0	Positive
Indicator 5.3: Management cohesion	+	
Condition 7: Multi-level network potential		Final score
Indicator 7.1: Room to manoeuver	0	0
Indicator 7.2: Clear division of responsibilities	0	Neutral
Indicator 7.3: Authority	++	
Condition 8: Financial viability		Final score
Indicator 8.1: Affordability	+	+
Indicator 8.2: Consumer willingness to pay	0	Positive

Indicator 8.3: Financial continuation	++	
Condition 9: Implementing capacity		Final score
Indicator 9.1: Policy instruments	++	++ Very positive
Indicator 9.2: Statutory compliance	++	
Indicator 9.3: Preparedness	+	

Condition 1: Awareness

1.1 Community knowledge

Most interviewees noticed that there was an underestimation of awareness regarding the problem of flood risk in the community in Rotterdam (SR001; SR002; SR003; SR004; SR005 and SR006). The community was aware due to the general understanding that Rotterdam is located at the river Maas and near the ocean. The increased risk in the future is not fully understood. People are also not aware that different housing locations in Rotterdam experience different levels of flood risk (SR004 and SR005). As one interviewee put it, people become aware, once they get wet feet (SR005). Knowledge plays a crucial role in making local stakeholders more aware and have them attain a more active role regarding the subject. The municipality has invested in making companies more aware (SR002). Progress has been made during the last ten years, and companies are more willing to act and invest in flood risk management measures (SR001). However, local awareness and involvement is still too low, for people to have an impact in the decision making process (SR001; SR002; SR003; SR004; SR005 and SR006). This underestimation of flood risk by the community results in a neutral score for indicator 1.1.

1.2 Local sense of urgency

During the last ten years the sense of urgency has increased (SR002). However the level is still substandard (SR003; SR004; SR007). Also as one interviewee argued, the sense of urgency quickly diminishes after a strategy has been published, creating a reoccurring conjecture in the level of urgency (SR002). This idea of conjecture in urgency or awareness level is shared by other interviewees albeit in relation to flood events (SR004; SR006). There seems to be a discrepancy between the level of urgency of politicians and policy makers and that of the local stakeholders. The policies at a national level and at the local level implement the highest safety norms of dikes and barriers available, making Rotterdam on of the safest delta cities in the world (SR002; SR005; Delta program, 2017). This discrepancy makes it hard to score this indicator appropriately. Although the urgency in the wider community is low, local authorities have a great sense of urgency and apply sustainable measures to minimize flood risk (Rotterdam Adaptation Strategy, 2013, p.6). Indicator 1.2: Local sense of urgency, is therefore scored with a +.

1.3 Behavioural internalization

If the stakeholders experience more hinder due to flood events, their readiness to act and adapt their behaviour increases (SR005), and because hinder due to flood events is becoming more frequent, local communities are starting initiatives to minimize flood risk in their neighbourhood (SR005 and SR004). For example, people living on dikes and near dike are naturally aware of the flood risk issue and are very weary of altering the construction of the dikes (SR007). Other interviewees however did not notice any behavioural change, many stating that the quality of the implemented flood safety measure ironically, create a situation wherein people do not have to worry about being flooded (SR002; SR003; SR005; SR006 and SR007), leading to a score of 0 for Indicator 1.3: Behavioral internalization.

Condition: 2 Useful knowledge

2.1 Information availability

Qualitative data regarding flood risk is widely available according to all interviewees and this facilitates well-informed decision making (SR001; SR002; SR003; SR004; SR005; SR006 and SR007).

Modelling is the main method used to calculate current and future flood risk. Models are however not a representation of reality and some uncertainty will remain in the information regarding the topic of flood risk and climate change (SR002 and SR007). Regarding integrated policies, the Rotterdam Adaptation Strategy (RAS) is aimed at coupling social, economic and environmental development to flood risk management objectives and measures (Rotterdam Adaptation Strategy, 2013, p.6). The availability of this information in regards to local stakeholders is less apparent. The municipality of Rotterdam tries to facilitate flood risk information through its website named the 'water counter' (Rotterdam, 2017), but it is an illusion to think that this website informs every person living in Rotterdam (SR004 and SR005). A water board in Rotterdam is currently developing apps in order for people to be able to monitor water levels in real time (SR007). Comprehensive information on flood risk is available and incorporated in to long term policies, therefore the indicator for information availability will score a ++.

2.2 Information transparency

Technical information regarding flood risk, albeit widely accessible and available, is not understandable for non-experts and decision makers (SR001; SR002 and SR007). Other ,less technical, documents and research regarding flood risk is intelligible (SR003; SR004; SR005 and SR006). Most policies regarding flood risk management are accessible via the internet and written in an increasingly understandable language (SR002). Professionals and experts are able to understand most information and translate this in to an understandable text which is published at websites which are accessible to everyone (SR006 and SR007). Stakeholders have to be interested in the subject in order to look for and access different information sources. There is however no comprehensive platform in place on which people can access and share information regarding flood risk. Information is available via diffuse sources and risks are not being actively communicated to local stakeholders (Overstroomik, 2017; Risicokaart, 2017). The municipality however has customizes information per neighbourhood and per targeted audience (SR004 and SR005). Information being accessible for all stakeholders and the actions being taken to make technical information more understandable result in a scoring of + for indicator 2.2: Information transparency.

2.3 Knowledge cohesion

The policies incorporate different scenarios and attain long-term strategies (Rotterdamse adaptatie strategie, 2013; Waterplan 2, 2013). The knowledge necessary to predict flood risk at the local level can only be obtained through producing and sharing different kinds of information between sectors and actors. Different departments within the municipality have provided information on demography and (drainage) infrastructure (SR001 and SR004). Water boards have provided data on water levels, dike norms and drainage capacities of local water bodies (SR007). Due to the nature of the different kind of information, multiple methods have been used in creating the needed information. The socio-economic and ecological aspects are being addressed in the local policy (Rotterdam Adaptation Strategy, 2013, p.6). Implementation of cohesive knowledge in policies was necessary in order to adequately deal with flood risk in Rotterdam, therefore indicator 2.3: Knowledge cohesion is scored with a ++.

Condition 3: Continuous learning

3.1 Smart monitoring

Monitoring is an integral part of the dike defense. Inspection and enforcement teams are monitoring and inspecting dikes on a daily basis, and each year, laser altimetry is applied in order to get a 3d image of all dikes surrounding Rotterdam (SR007). The sewage system is monitored at a random sample in order to get an overview of discharge levels throughout the city and the system is maintained via an asset management approach (SR004; SR005). It is recognized by the municipality that there is room for improvement in this matter. The whole flood risk monitoring system has yet to be made smart so that stakeholders and policymakers can not only understand trends but so that they also have the knowhow and ability to solve issues at a more integrated level (SR001). Indicator 3.1 receives a neutral score because alarming situations can be recognized but there is no information gathered in order to recognize underlying processes or the Rotterdam's drainage system.

3.2 Evaluation

The sewage service, which plays a role in flood events, is being evaluated via an asset management approach (SR004 and SR005). Flood risk management projects which are being implemented are evaluated at the level of individual projects (SR006 and SR007). Many pilots are monitored individually and the total impact of these individual projects on minimizing flood risk or the total urban area remains uncertain. Therefore the city is not yet able to evaluate the entire impact of these measures in the integrated urban water system. The municipality aims to evaluate its policy on a more frequent level, but budget constrains create some barriers (SR004 and SR005). Local flood risk policies are not evaluated on a yearly cycle but they are rather revised every now and then (SR007; Waterplan 2). This evaluation indicator receives a neutral score of 0 because current practices are being improved and innovative integrative evaluation is lacking.

3.3 Cross-stakeholder learning

The local policies incorporate stakeholder engagement and stakeholder consultation as a means to improve the implementation process, and to use local knowledge to create better projects (Water plan 2, 2013, p.20; (Rotterdamse adaptatie strategy, 2013. p 27). Interviewees however stressed the need for more integral thinking and more cooperation between different sectors such as, urban planners, development and dike construction companies in order to incorporate different functions in water defence structures (SR001; SR003). Therefore, integrated thinking and learning between sectors and stakeholders remains a niche (SR001). The Cross-stakeholder learning indicator will therefore receive a neutral score of 0.

Condition 4: Stakeholder engagement process

4.1 Stakeholder inclusiveness

The city has included citizens, companies, utilities, knowledge institutes and societal organizations in the process of formulating local flood risk management policy (Rotterdamse adaptatie strategy, 2013. p 26). It enables active involvement of these stakeholders by letting them produce new flood risk adaptation measures which the municipality can facilitate and help implement (Rotterdamse adaptatie strategy, 2013. p 27). Promoting communication between water boards, designers, advisors, urban planners and the governmental bodies is also addressed as being crucial for success (Water plan 2, 2013, p.20). Stake holder engagement is therefore sufficiently present in the local policy. The municipality holds multiple consultation rounds in neighbourhoods which are tailor made to the demographic characteristics of the local community (SR004; SR005). Because municipalities have to ensure safe living conditions for its citizens set out in the national flood safety plans, local stakeholders sometimes cannot officially oppose measures of national safety and these norms form preconditions in which local communities are engaged at a later stage (SR007). For safety reasons, sometimes measures have to be implemented, with or without consent of the community (SR001). Companies, mostly utilities and petrochemical which are located in the harbour of Rotterdam, have been included in the policy process due to unforeseen implications and impacts that floods can have on these companies and society alike (SR001). The stakeholder inclusiveness indicator receives a scoring of ++ because relevant stakeholders are involved in the policy process and the local community is consulted in a very elaborate manner.

4.2 Protection of core values

Stakeholders have the opportunity to influence the outcome of policy processes and flood risk projects, but they cannot override legislative obligations of local governments in regard to water safety (SR001). The creation of a water square, which is an innovative combination of water attenuation infrastructure and recreative public space, was halted because members of the local community were concerned with child safety and blocked the implementation process (SR004; SR005). Eventually, forcing the municipality to cancel the project altogether (SR001). The community was however informed and consulted multiple times at an early stage of the project, and during this engagement

process the municipality received little feedback (SR005).This is a good example of stakeholders having influence in the end result and Indicator 4.2: Protection of core values, is therefore scored with a +.

4.2 Progress and variety of options

Alternatives were being explored by multiple actors and local stakeholders can be actively involved in policy formulation processes, if this is not obstructing legislative obligations in regards to water safety. Alternatives are sometimes elaborated with the help of stakeholders. A planned dike reinforcement was replaced by an alternative which was created after a consultation session with businesses who were located at the dike, and for which the dike was a crucial logistical infrastructure (SR006). The dike reinforcement implied that the dike had to be closed for a period of time and the chosen alternative ensured that a new segment of dike was constructed circumventing the infrastructure on the existing dike which had high economic value for local business (SR006). The water boards also choose to formulate alternative formats for a single flood defence projects which enable local stakeholders to select the most feasible alternative, thus fostering effective implementation (SR007). There is sufficient room to select and elaborate alternatives. However, due to legislative requirements of the authorities to ensure water safety (Deltawet, 2011), decisions may not be fully supported, resulting in a score of + for indicator 4.3.

Condition 5: Management Ambitions

5.1 Ambitious and realistic management

The goals set in the local policies, which include making Rotterdam water proof (Waterplan 2, 2013) and climate proof in 2025 (Rotterdamse adaptatie strategy, 2013), are not necessarily clear. In the strategy they elaborate on this by saying that it must have implemented the measures which ensures that Rotterdam experience minimal risk due to climate change and can reap the maximum amount of benefits (Rotterdamse adaptatie strategy, 2013. p 23) The overall goal of making the city water proof is also not very clear, however the more specified goal in relation to water safety, namely, protecting the city of Rotterdam against flooding now and on the long term, is more clear (Water plan 2, 2013, p.13). Because these goals are encompassing, they are not necessarily very concrete. All interviewees agree that the goals are ambitious (SR001; SR002; SR003; SR004; SR005; SR006 and SR007). The answers given related to the achievability of the goals differ. Most of the interviewees acknowledge that the challenges Rotterdam faces relating to flood risk are big and will require long term structural actions to take place (SR007; SR005; SR003). The local policies do however address a long term vision (SR006; SR001; Waterplan 2, 2013; Rotterdamse adaptatie strategy, 2013. p 23). Local flood risk management policies include uncertainty by adhering to different scenarios and by incorporating the newest insights and predictions relation to climate change (SR001; SR006; Water plan 2, 2013, p.6; Rotterdamse adaptatie strategy, 2013. p 13). The implementation of the policies is promoted due to the intermittent targets embedded in the policies (SR006; Rotterdamse adaptatie strategy, 2013. p 100/127; Water plan 2, 2013, p.62/66) which make these policies not only ambitious but also realistic. Indicator 5.1: Ambitious and realistic management is therefore scored with a ++.

5.2 Discourse embedding

Historically Rotterdam has been engaging in flood risk management since its early beginning (Rotterdamse adaptatie strategy, 2013) and being a delta city it continues to address this issue to this day. Culturally, early settlements have been located near or on dikes for safety reasons and because subsoil near rivers provided better foundation for the early construction of houses in the Netherlands (SR006; SR007). These culturally valuable settlements now appear to be barriers for the implementation of new flood defense measures such as dike reinforcements (SR006; SR007). It being a safety issue, flood risk is incorporated in the political context of Rotterdam (SR001; SR002; SR006). Hence, flood risk is in multiple ways strongly embedded in the local, cultural and political context, discourse embedding receives an indicator score of ++.

5.3 Management cohesion

The city of Rotterdam falls in the district of three different water boards and therefor has to deal with three different political bodies which attain different agendas and measures regarding flood risk (SR007). On a governmental level the policies are very much aligned, creating a national coherent flood risk policy, which also governs the city of Rotterdam (SR006). Furthermore, local policies adhere to national flood risk policy measures and norms strictly (Waterplan 2, 2013, p 8). However, inter-sectorial meetings, in particular between the three water boards, the municipality and main businesses in the harbour, are still a niche and there is still little evidence of inter-sectoral implementation of measures (SR001; SR004 and SR005), resulting in an management cohesion indicator score of +.

Condition 6: Agents of change

6.1 Entrepreneurial agents

Agents of change are very important for maintaining a sense of urgency of this topic in political and administrative spheres, however due to budget cuts, the number of these agents of change have diminished during recent years (SR001). Experiments relating to future flood risk management are implemented, albeit on a small scale (SR004 and SR005). Examples of these small scale pilots are, a floating forest, a floating farm, floating houses and a floating hotel (SR001; SR004 and SR005). Although the access to resources is limited for agents of change, many small-scale pilots are being implemented and supported by the municipality. However, many agents of change still struggle to step beyond tentative experimentation settings and therefore indicator 6.1 will receive a positive score of +.

6.2 Collaborative agents

There are few examples of inter-sectorial measures (SR001), even less which address flood risk in an unconventional way. Unconventional measures do exist, such as the creation of underground parking spaces which can function as an attenuation and water storage area. However, these are implemented mostly by a partnership between the municipality and of the three water boards (Rotterdam Climate Initiative, 2017; Waterplan 2, 2013). In some cases the municipality is working together with companies located in the harbour, creating rare inter-sectorial projects such as 'tidal parks' *(getijden parken; Rotterdamse adaptatie strategie, 2013, p 71).* An unclear division of responsibilities and roles is hampering the implementation of inter-sectorial flood risk management measures (SR007). Indicator 6.2 will therefore receive a neutral scoring of 0.

6.3 Visionary agents

All policies adhere to a long term vision, and all interviewees articulate the same vision (SR001; SR002; SR003; SR004; SR005; SR006; SR007; Waterplan, 2013; Rotterdamse adaptatie strategie, 2013). Shor-term targets and implementation programs ensure the realization of the long-term flood risk strategies (Waterplan, 2013, p 16). However, it is not clear to what extent visionary agents of change play a role in this. Legal requirements force governments to ensure effective flood risk management (Delta wet, 2011; Bestuursakkoord water, 2011), and this legislative context is a dominant factor in creating long-term strategies in the case of Rotterdam (SR002). Indicator 6.3 will receive a scoring of + due to the uncertain role of agents of change but high quality policies, which have a long term vision and are supported by short-term targets are well established.

Condition 7: Multi-level network potential

7.1 Room to manoeuvre

There is room for developing alternative approaches and implementing innovative flood risk measures (SR001; SR007; Rotterdamse adaptatie strategie, p 26). However, they are applied sporadically, because the dike construction sector and storm water management sector are very conservative (SR001; SR007). Flexibility and manoeuvrability is embedded in the local policy, due to responsibility

issues and conservative stances of certain sectors, there is limited room for actual innovation and collaboration. Therefore indicator 7.1: Room to manoeuver, will be scored with a 0.

7.2 Clear division of responsibilities

Responsibilities are being addressed clearly in local flood risk policies and they strongly depend on the flood risk measure which is being implemented (Rotterdamse adaptatie strategy, 2013. p 71, p 77,p 81). Most interviewees agree with the notion that responsibilities are clearly formulated and translated in to legislative documents (SR001; SR006 and SR007). The responsibilities are allocated to a conventional set of actors, including municipalities, water boards, the Dutch government and the Delta commissioner because flood risk is a matter of public safety (SR001; SR006; Waterplan 2, p 22). There seem to be some difficulties understanding the limits of responsibilities each respective actor can have in implementing and maintaining certain measures, creating a situation wherein, depending per project or issue, some actors try to seek to claim the minimal amount of responsibility, where other actors try to get the most responsibility (SR004 and SR005). Because of the conventional division of responsibilities in relation to flood risk, this indicator 7.2 will receive a neutral score of 0.

7.3 Authority

The Delta commissioner, which is an independent political actor tasked with governing national water safety, contributes to a long term solution for flood risk by creating long-term flood risk policy to which only the parliament can make small adjustments (SR006) This policy also impacts the flood risk policy of the city of Rotterdam. The current mayor contributes to long-term sustainable solutions by addressing water safety publically in the media and by making it a main subject of local politics (SR007). The city actively present itself as being the safest delta city in the world to promote its water management sector and the mayor plays a big role in this (SR001). Because solutions are promoted by and are well embedded in local authorities, indicator 7.3: Authority will receive a scoring of ++.

Condition 8: Financial viability

8.1 Affordability

Many interviewees found the climate adaptation measures to be affordable for all citizens due to the funding structure behind these measures (SR002; SR003; SR006 and SR007). Funding is done via taxes and levies and most of the time, crucial local flood risk measures, such as dike reinforcements or barrier constructions are funded by overarching national programs which in turn are funded from national funds (SR007). Some interviewees argue that Rotterdam, being faced with more risks than other cities, has disproportional expenses regarding flood risk compared to other cities (SR004). Whilst Rotterdam is not a rich city in terms of demography, all citizens have to help carry this huge expense related to water safety, thus putting more strain on the poorer people in the City of Rotterdam. (SR005). Due to this limited affordability of climate adaptation services, indicator 8.1: Affordability will receive a scoring of +.

8.2 Consumer willingness to pay

The municipality has recently received a report from a citizen panel, which are a representation of the citizens in Rotterdam, stating that the citizens are content with the way the municipality manages flood risk (SR004 and SR005). The panel report even described a sentiment that more municipal funding toward water safety was seen as feasible. Indicating that people are content with the current expense of the municipality, necessary to mitigate flood risk and that the people are expecting that this spending will rise in the future (SR004). However, most interviewees believed that most stakeholders are not aware of the water challenge, have no clue regarding the expenditure amount and have no strong opinion regarding their own willingness to pay (SR001; SR002 and SR003). Other interviewees stated that they did not have the insight needed to comment on this question (SR006 and SR007). Indicator 8.2: Consumer willingness to pay will therefore receive a neutral scoring of 0.

8.2 Consumer willingness to pay

Financial continuation is secured through an independent national fund, called the Delta fund, and this is found crucial for the implementation of many flood risk policies (SR001; SR003; SR006 and SR007). This fund is not subjected to changes in political sentiment and it is a structural part of the national budget. The fund is created in order to ensure the implementation of long term strategies which minimize flood risk and to ensure that adequate funding is available for projects in the future. By doing so the Delta fund enables national compliance with the Delta law, which mandates the Dutch government to protect all citizens from the risk of flooding (Delta law, 2011). The municipality contributes to the financial continuation by upholding a no-regret approach, which means that policies and measures which are proven to be effective are continuously improved (SR001). Big, expensive plans and projects which are subjected to a high level of uncertainty are being put on a hold until uncertainty levels have been reduced, as to minimize inefficient budget spending (SR001). The High Water Protection Program (HWPP), which is a part of the Delta fund, ensures funding for all water safety measures which need to be implemented by water boards and local governments such as municipalities (SR007). However, budget cuts and austerity measures have led to alterations of long-term strategies and risk policies in other sectors, such as the fire brigade and the rescue brigade, minimizing the capacity to execute emergency evacuation plans and contingency plans (SR001). As one interviewee cleverly put it, "because financial continuation is secured, we do not have to spend time and resources at ensuring proper funding ourselves' (SR007) implying that there is this somewhat hidden beneficial financial aspect to the Delta fund. As previously explained, the city of Rotterdam experiences long-term financial continuation and indicator 8.3 will receive a scoring of ++.

Condition 9: Implementing capacity

9.1 Policy instruments

The setting of water safety norms is written down in legislative text and this ensures a high level of compliance (SR002; SR006). In order to stimulate compliance of dike protection policies of the water boards, enforcement is done by enforcers who survey dikes on a daily basis (SR007). The municipality of Rotterdam has promoted the used of soft compliance mechanism such as communication and financial incentives to stimulate compliance (SR004 and SR005). This approach however, resulted in hampering and slow policy implementation by relevant stakeholders and they are currently investigating more stringent policy instruments to ensure compliance (SR005). Flood risk adaptation policies from Rijkswaterstaat, the executive body of the ministry of infrastructure and the environment, have experienced similar results with soft compliance mechanisms and are now looking to implement other policy instruments (SR006). In the local policies there is no mentioning of policy instruments to ensure compliance, nor enforcement (Waterplan 2, 2013; Rotterdamse adaptatie strategy, 2013). Legislative instruments prove to be extremely effective, and enforcement is done at the level of dike protection. Even though some other softer policy instruments, such as financial incentives for the construction of green roofs have experienced poor results (SR004 and SR005), effective policy instruments are in place, justifying a score of ++ for Indicator 9.1: Policy instruments.

9.2 Statutory compliance

All interviewees state that current national legislation on water safety is very clear and that it fosters stakeholder compliance to agreements and policies regarding flood risk management (SR001; SR002; SR003; SR004; SR005; SR006 and SR007). The municipality is working closely with other stakeholders to improve the implementation process of its local policies and local flood risk management projects (SR001; SR004 and SR005). The communicative approach of the municipality to stimulate stakeholders did however not result in the envisioned levels of compliance (SR004; SR005). Different interpretation of laws can also result in a certain amount of legislative freedom of stakeholders, which can lead to a sparring exercise between local governments and stakeholders in order to establish a clear legislative framework (SR001 and SR004). The municipality is open to dialogue and sometimes the municipality can temporary halt or adjust rules in order to promote stakeholder compliance or to facilitate innovative flood risk projects (SR001). Overall compliance to existing legislation is good, leading to an indicator score of ++ for statutory compliance.

9.3 Preparedness

The city of Rotterdam is prepared to a certain extent. It is true that the city is adaptive in the sense that it applies different scenarios to its flood risk management policies, including worst case scenarios (SR001; SR006; Rotterdamse adaptatie strategie, 2013; Waterplan 2, 2013). The future obligation of all Dutch municipalities to execute stress tests in relation to flood risk will most likely improve the governance capacity of cities (NOS, 2017), as it improves flood risk awareness and promote the implementation flood risk measures (Deltaprogramma, 2018). Emergency planning exercises are becoming frequent in Rotterdam, helping to strengthen preparedness and citizen awareness (SR001; SR006 and SR007). The capacity to execute these emergency plans has become a real challenge however. The city is currently not capable to preform large scale evacuations and to implement its contingency plans although it is becoming an increasingly important theme in the flood risk governance arena of Rotterdam (SR001 and SR006). A member of a water board active in Rotterdam said that the amount of capacity really depends on the scale of the calamity. Small scale calamities can be addressed by the city's current capacity but large scale calamities require more capacity than which is currently available (SR007). In order to ensure Rotterdam's future socio economic development and its habitability the next century, strategies will have to be implemented in a shorter timeframe (SR001). Due to recent climate change model predictions, which predict higher sea level rise and river discharges and also predict that climate change is expected to have much more impact on Rotterdam then currently addressed in policies (SR001 and SR006). Although Rotterdam is currently one of the safest delta cities in the world, it needs to upscale is action plans and implement policies in a shorter time frame in order to ensure continued preparedness. The indicator for preparedness (Ind. 9.2) is therefore scored with a +.

3.2.3. Identifying the key opportunities to enhance the governance capacity

Table 12. Overview of governance capacities Milton Keynes and Rotterdam

Conditions	Indicators	Milton Keynes	Rotterdam
1 Awareness	1.1 Community knowledge	-	0
	1.2 Local sense of urgency	-	+
	1.3 Behavioral internalization	0	0
2 Useful knowledge	2.1 Information availability	+	++
	2.2 Information transparency	++	+
	2.3 Knowledge cohesion	0	++
3 Smart monitoring	3.1 Smart monitoring	0	0
	3.2 Evaluation	+	0
	3.3 Cross-stakeholder learning	0	0
4 Stakeholder engagement process	4.1 Stakeholder inclusiveness	+	++
	4.2 Protection of core values	0	+
	4.3 Progress and variety of options	0	+
5 Management ambition	5.1 Ambitious and realistic management	++	++
	5.2 Discourse embedding	0	++
	5.3 Management cohesion	0	+
6 Agents of change	6.1 Entrepreneurial agents	-	+
	6.2 Collaborative agents	0	0
	6.3 Visionary agents	0	+
7 Multi-level network potential	7.1 Room to manoeuver	0	0
	7.2 Clear division of responsibilities	0	0
	7.3 Authority	-	++
8 Financial viability	8.1 Affordability	++	+
	8.2 Consumer willingness to pay	0	0
	8.3 Financial continuation	0	++
9 Implementing capacity	9.1 Policy instruments	0	++
	9.2 Statutory compliance	0	++
	9.3 Preparedness	0	+

For Milton Keynes there is room for improvement in most governance capacities, as all but one governance condition were sub-optimal (table 12). Awareness, the condition which has scored the lowest should be improved first in order to facilitate more effective policy implementation and formulation. Community knowledge can be improved by investing in programs which raise awareness such as informative campaigns on flood risk. Local sense of urgency could be improved by improving risk communication and spreading knowledge on the nature and impact of flood risk (O'conner et al., 1999). Behavioral internalisation should be improved by applying targeted empowering messages to the people and the spreading of social norms (Gifford, 2011). The condition continuous learning was also suboptimal for both cities and this could be improved by addressing all three indicators. Both cities can improve their smart monitoring, by investing in the implementation of new flood monitoring applications in the existing infrastructure and by combining local data with existing observations made from satellites (El-Bendary et al., 2013; Visser & Dawood, 2004). Evaluation can be promoted by adhering to a combination of action strategies supplemented by continuous monitoring (Temeer et al, 2013). Cross-stakeholder learning could be improved by monitoring the quality of the communication process in these governance networks well as promoting a form of membership which goes beyond participation (Pahl-Wostl et al., 2007). In Milton Keynes, condition 4, stakeholder engagement process could be improved by enabling more active involvement of stakeholder in the decision making process (OECD, 2015b). Also enabling stakeholders engagement wherein there is room to explore and select alternative for proposed policies and projects, thus increasing the stakeholder influence in the end decision (Koop et al., 2017; Ridder et al. 2005). In order for Milton Keynes to improve its overall policy

ambitions (condition 5) the city should focus on better management cohesion. This could be improved by promoting the formulation of joined goals which should lead to a less overly fragmented flood risk management approach (OECD, 2011). There is also room for improvement on condition agents of change, in Milton Keynes. Different agents should draw more attention to their ideas and the formulation and implementation of pilot projects should be supported more by the council in order to foster more entrepreneurial agents of change (Ind. 6.1) in the flood risk governance arena (Brouwer & Biermann, 2011). An increase in collaborative agents (Ind. 6.2) can be realised by promoting leadership which is favouring collaborative governance (Bryson et al., 2006; Emerson et al., 2012). This willingness will most likely decrease the transaction costs associated to the construction of new collaborative regime (Schneider et al., 2003). Condition 7; multi-level network potential was the second governance condition for which both cities have scored sub-optimal. By giving actors more freedom to form new partnerships and at the same time enabling these new networks to create innovative ways of addressing the issue of flood risk (Stigt et a., 2013; Koop et al., 2017), both cities can improve the room to manoeuvre (Ind. 7.1) which is beneficial for the network potential. Responsibilities (Ind. 7.2) should be shared more and contractual agreements could be used to clarify specific responsibilities and the extent to which parties can be held accountable (Mees, 2014). The authority (Ind. 7.3) is however very well developed in Rotterdam and Milton Keynes study this municipality and its mayor for learning purposes. It could be valuable to study the way Rotterdam presents itself and how this city tries to address the flood risk challenge and apply these best practices in their own administrative boundaries. The governance condition 8, financial viability could be improved in Milton Keynes by improving the financial continuality which is needed to ensure policy implementation. This could be facilitated by first calculating the so called cost of in action (Ruth et al.,2007; Shardul & Samuel, 2008). This calculation could enable financial continuation by justifying a local tax raise or it could promote the construction of a national repository, which preferably shared similarities with the delta fund regarding its long term funding and independence from party politics. The implementing capactity could also be improved in Milton Keynes. This final governance condition (condition 9) should be improved by using (legal) policy instruments (Ind. 9.1) such as contractual agreements for flood risk projects and flood resilient building related to spatial planning or to mandate flood safety measures to be included in the building code for flood prone development (Mees et al., 2014). Economic instruments could be applied as well in the form of smart subsidies, which foster the implementation of flood risk policies and measures (Mees et al., 2014). Statutory compliance (Ind. 9.2) can be promoted by formulating effective laws in such a manner that they can be enforced (van Rijswick et al., 2014). Also if in the decision making process all interest are being taken in to account, statutory compliance will naturally be higher (van Rijswick et al., 2014). Finally, comprehensive preparedness can be achieved by supplementing long-term strategies with worst case scenarios and contingency plans Allocation of resources, the training of staff and most importantly rehearsing evacuation and calamity plans should improve the preparedness of a city (Allen, 2007; Koop et al., 2017).

3.3 Integrative analysis of the localized context

The third step is to create an overview of the difference in importance of certain governance conditions which enable each city to effectively govern their flood risks, as a result of the different multi-level policy frames of both countries. These results may provide valuable results to understand the key opportunities and limitations imposed to cities in different countries and help these cities identify opportunities to improve their flood risk management. Moreover, these results may provide valuable insight to enhance meaningful city-to-city learning and can help decision makers and policy makers, to strengthen the capacity of their city to govern their specific flood risk challenges.

3.3.1 Evaluating the impact of the policy frame on governance capacity of Milton Keynes

By comparing the governance capacities to the national and regional policy frame it is relatively easy to identify barriers and enablers for enhancing the governance capacity of Milton Keynes.

National legislative documents, which are the result of ratification of European policies , try to address flood risk by allocation responsibilities to certain authorities and to obligate the production of flood risk management material such as flood maps and river basis management plans. Although it has become clear which stakeholder is responsible for addressing which part of flood risk management measures, it has led to a situation wherein the governance arena has become overly fragmented. Each actor is responsible for different governing different section of the water challenge and is evaluated and assessed on the performance of these exact responsibilities. Due to austerity measures the amount of national funding has been reduced and individual budgets have to be used very efficiently in order to be able to manage responsibilities relation flood risk governance. This created a situation wherein actors are fixed at their performing their own responsibilities within the available budget. In this current state, the governance arena of flood risk in Milton Keynes, lacks incentives to promote cooperation between actors and the opportunities to explore the creation of shared funding arrangements are not being recognized and exploited. This is translated in to low governance capacities regarding management cohesion, entrepreneurial agents and collaborative agents in Milton Keynes. Effective river basin management approaches are also lacking due to the different administrative boundaries and responsibilities of risk management authorities. This fragmentation does not promote a shared problem conception, cooperation or the creation of more efficient shared funding schemes and is a barrier for improving the governance capacity of Milton Keynes in relation to flood risk.

Another aspect of the national policy frame imposed on Milton Keynes, is the lack of stakeholder engagement in these respective policies and legislation. This lack in stakeholder engagement naturally leads to a lack in the variety of alternatives, cross stakeholder interaction and knowledge cohesion, as could be seen in the governance capacity analysis. This puts a barrier to the creation of complete knowledge and limits the formulation of effective and adaptable local policies.

Funding as previously explained has been limited due to austerity measures. The entire flood risk policy frame, including national, regional and local policies, has received sub-optimal scores in relation to long-term funding. Funding has a reoccurring limiting impact on the capacity to address flood risk in the UK which cannot be neglected. This lack of national funding has had a negative impact some of the governance capacities of Milton Keynes, including financial continuation and the overall preparedness of the city. Also the realisation and implementation of long-term policies are being made difficult due to this uncertainty in funding, minimizing the adaptability and preparedness of the city.

3.3.2 Evaluating the impact of the policy frame on governance capacity of Rotterdam

National policies on flood risk are very comprehensive and include yearly evaluation in order to maintain effective. National law obligate the formulation of effective national flood risk policies, and

mandate that these have to be updated every year (Deltawet, 2011; Waterwet, 2017). In this way, national policies deal with uncertainty and enable the city of Rotterdam to adequately prepared for the future. However, this continuous evaluation of national policy seemingly translated to a diminished need to evaluate local policies, as the governance capacity regarding evaluation and continuous learning is sub-optimal for the city of Rotterdam.

Local governmental policies, which have to adhere to these existing national policies, try to excel by addressing local water issues in innovative ways (Rotterdam Climate Initiative, 2017). These initiatives are fostered by local authorities which actively promote the implementation of effective innovative flood risk measures. In the case of Rotterdam, a effective integration of national and local policies is visible (CITE). Because the national policies promote a shared problem vision and a shared problem approach in order to manage flood risks, local stakeholders are also involved with contributing to the same solutions, enabling the integration of all flood risk policies in the Netherlands. This translated into good management cohesion, preparedness and stakeholder inclusion.

Most policies have clear goals which are supported by intermitting targets. This not only strengthens the capacity of Rotterdam to be prepared, it also complements to capacity regarding ambitious and realistic management of flood risk.

Long-term funding of flood risk policies has been ensured by law (Delta wet, 2011) this in combination with the shared problem approach creates a unique situation wherein financial continuation is realised for all flood risk policies except the local policy Rotterdam Adaptation Strategy, which had no mentioning of funding in its contents. The existence of the Delta fund, which is independent and not subjected to the scrutiny of political parties, ensures funding until 2030 for most flood risk management projects and measures. Because the fund cannot be influenced or altered by party politics, the Delta fund enables an annual investment of 1 billion euros in flood risk management projects and governance (Delta programma, 2016, p 92). This comprehensive financial continuation is crucial for implementing long-term flood risk policies and in order to adequately protect Rotterdam against future floods.

The existence of national law which mandates the government to protect its people from the risks of being flooded (Deltawet, 2011; Waterwet, 2017) ensures statutory compliance is being realised by municipalities and other governmental bodies such as water boards.

Discussion

4.1. Societal and scientific value of results

Increased sea-level rise and more frequent extreme precipitation events will increase the flood risk in the future, damaging cities and endangering urban dwellers. The UK's vulnerability to flooding led to the creation of the Pitt review in 2007, which stressed the need for better flood risk management in cities throughout the country. The Netherlands, being partly located below sea level is expected to experience more risk because of these future changes. Cities in both countries need to develop governance capacity to face current and future flood risk challenges.

Although recently some efforts have been made to assess the capacity of cities to govern water issues (OECD, 2015b), currently the literature is still lacking a coherent empirical approach which can compare the governance capacity of cities in a consistent manner (Biesbroek et al. 2013; Kersberger and Waarden 2004). This minimizes the ability to identify overarching lessons and allows observation of larger patterns concerning governance capacities and flood risks and diminishes the usefulness of these existing approaches (Koop et al., 2017). This lack of coherent empirical governance analysis approaches is a barrier to cross-city learning (Measham et al. 2011; Plummer et al. 2012).. Although some efforts have been made in to assess and compare urban water governance, (Measham et al. 2011; OECD 2015b) and literature on policy effectiveness is abundant, only some attempts have been made indicating the relation between policy and governance capacity (Hajer & Wagenaar, 2003; Hezri & Dovers, 2006). Only a very small number of studies have assessed this relation to the issue of flood risk (Gaillard, 2010; Corfee-Morlot et al., 2011). This study takes an unique angle because it is a comparative empirical-based study which focusses on the influence of supranational, national and regional policy on the relevance and balance of urban governance conditions required to address flood risk challenges. Therefore there are some limitations present in this research which will be discussed in the following sections. This study has created new insight in the influence of regional, national and supranational policy has on the capacity of cities to govern their flood risk for the first time. By analyzing policies using a newly constructed policy analysis framework, this research was able to clarify the influence of the Dutch and UK imposed policy frames on the capacity of cities to govern flood risk. By combining these insights with the empirical data base of the GCF, nations and cities can either adapt or alter policies to promote their governance capacity or strengthen capacities which are not being complemented by existing policies.

By apply a systemic governance capacity analysis, to more cities; this research contributes to an empirical base, which can be utilized by cities to learn from. With the creation of this database, the Governance Capacity Framework (GCF) tries to remove a barrier for cross-city learning, thus enabling cities to have access to knowledge which is becoming increasingly more valuable. The results produced by this study have contributed to this data base and have provided new insights in the influence of the European, national and regional policy frames on the capacity of cities to govern their flood risk. First, this study has categorized and assessed all relevant flood risk policies on the supranational, national and regional level, of two countries which is unique in the scientific literature. Second, the importance of supranational policy in helping cities govern their flood risk has become apparent in the case of Milton Keynes, in which effective ratification has led to the formulation of local flood maps, flood management plans and allocations of responsibilities in a new flood risk governance arena. The room to further improve local capacities became apparent by examining the case of Rotterdam, which although being subjected to the same imposed supranational policy frame, chose to excel and exceed the obligations set in European policies because of historic and geographical context. The results gathered by applying the GCF to both cases did not only identify the vulnerabilities in the capacity of cities to govern flood risk it also enables the formulation of instructions on how to improve these deficiencies. By doing so this research helps cities to govern their flood risk and can help protect societies from the risk of flooding in the future. The research has stressed the importance of adequate financial continuation in policies. It has also made clear that allocation of

responsibilities in policies should not be overly fragmented and having shared goals and responsibilities can improve the capacity of cities to govern flood risk. By providing new insights in the relation between policy and capacity, these results enable cities to become more resilient to flooding, thus enabling this research to achieving its aim. These results could be used to discuss the effectiveness of supranational policy in times when European policies and influences are constantly scrutinized.

4.2. Limitations

4.2.1. Limitations methodology

The Governance Capacity Framework (GCF) is an ambitious and a relative new approach. It provides the tools to compare the governance capacities of different cities in relation to flood risk and the GCF enables cross city learning. It strives to produce results which are empirical and therefore reproducible. However, it is exactly this aim of providing an overarching analysis that also leads to a very comprehensive, elaborate and technical analysis method. Although the highly technical predefined questions provide a good indication of the knowledge which is needed to be abstracted from the interviewee, at times, even when translated to understandable questions, they tend to complicate the structural flow of the interview, sometimes confusing interviewees. This research tried to overcome these challenges by subdividing the predefined questions in to smaller questions which would also be made less technical to make them more understandable. Depending on the interviewee, questions were made tailor-fit and only the questions which were relevant to the interviewee were addressed in order to promote the flow of the interview by adhering to relevant topical trajectories (Cohen & Crabtree, 2006). Also because of the quality standards of the scoring rubric, an interviewee has to be very knowledgeable in order to be able to answer most questions in to detail. Because of this need of high level experts, the right interviewees are sometimes hard to get in contact to, without having access to the right network. This issue could be resolved by investing more time and effort in identifying and contacting the right interviewees.

The scoring sometimes became complicated because certain interviewees provided data which partly justified a score of + and partly a score of -. In these cases policy data and other secondary data would help justify a final score if they were available. This difficulty was also present when the criteria were not conclusive for a - or a + score, as was the case with scoring the monitoring indicator in Rotterdam. Asset management and monitoring at a random sample of the sewage system, were in contrast with the 3d altimetry which was used to scan dikes for any weak spots or to identify certain damaging trends, ultimately here it seemed best to give the indicator a neutral score. These kinds of necessary scoring compromises or balancing exercises do however increase the risk of subjective scoring. This issue can be solved by attaining a more specified and concrete scope when analysing a water challenge. By focussing solely on dike improvements or SUDS as a means of mitigating flood risk, this limitation of subjective scoring ceases to exist. These kinds of issues could be easily solved by supplementing a short paragraph to the GCF wherein practical guidelines are incorporated, some of which explaining how to best finalise an ambiguous score. These guidelines could be updated by using the feedback of researchers who applied this framework. Furthermore, because flood risk is a topic which is related to risk governance in some cases measures have to be implemented in interest of national security, public safety and because of legal obligations. These factors do not necessary promote the use of stakeholder engagement in policy formulation and implementation. Meaning that in some cases, for example, in setting and improving the norms for the dikes, stakeholders are hardy involved in the decision-making process. This exclusion does lead to more effective flood risk governance even though the governance capacity is diminished according to the standardized scoring system of the GCF. Moreover, stakeholder participation and engagement are not a guarantee for effective policies (Arnstein, 1965; Thomas, 1993; Mees et al., 2014). Because of this, it was sometimes hard to get valuable information on indicators which involved stakeholders (Ind. 3.3, 4.2 and 4.3) on the issue of flooding and made it more arduous to score them according to the predefined rubric which tend to correlate stakeholder engagement to more effective governance capacity.

Lastly, although the reproducibility of the results are somewhat ensured by applying a stakeholder analysis in order to select relevant stakeholders, the availability of interviewees and their specific answers they give do however complicate the reproducibility of the results. Although there is no panacea for this small imperfection it could help to send a survey to each stakeholder organisation either before or after conducting the interview from which some data on the governance conditions can be extracted. This complementary data source for the GCF could provide some more consistency in the overall results produced by the governance capacity analysis.

The policy analysis in retrospect could have focussed more on different compliance mechanisms other than enforcement, such as economic, legal and communicative compliance mechanisms. A scoring rubric similar to the GCF would greatly enhance the reproducibility and justification of its results.

4.2.2 Data limitations

There were also some limitations to the data which was gathered and used during this research. The data gathered in Milton Keynes, as could be seen in the analysis of the governance capacity of the respective city, was less comprehensive and did not allow for the same level of in-depth research as was the case in Rotterdam. Because the city was experiencing limited flood risk, this led to an underestimation of the risk. Due to this low experienced level of urgency and the strong believe in the cities design and drainage capacity, the city had little experts on this issue. Therefore, it was difficult to abstract the needed information, necessary to score each indicator to the same level of accuracy as Rotterdam. The Flood Risk Management Officer post was vacant during my visit in Milton Keynes, which was an illustration of the lack of interest and necessity experienced in the City. The recent economic crisis has had an impact of policy funding, thus leading to a situation wherein the policy creation date can have an impact on their financial continuation. Future policies will therefore most likely enjoy higher levels of financial continuation.

4.2.3 Data saturation

Data saturation can be an issue in science, and when a qualitative study requires interviewees, data saturation becomes a real question. There are no stringent guidelines or norms in scientific literature for data saturation as it depends on the quality of the data which can be abstracted from the conducted interviews. There is also no established method in scientific literature for assessing data saturation for interview studies (Francis et al., 2010). For applying the governance capacity framework, there are also no strict guidelines available. In the article in which the method was introduced by its authors, three interviews were conducted per water challenge in order to attain a sufficient level of data saturation needed to assess the governance capacity for each of the five water challenges (Koop et al., 2017). Flood risk which is one of these five challenges, has been assessed in this study by conducting seven interviews per city. Although the number of seven interviewees might not seem sufficient to achieve data saturation, other data such as a scientific literature, policies, action plans and grey literature have been studied and these sources complement each other. However, in relation to the interviews, flood risk being related to public safety and being governed at the council level, means that there are limited amount of expert to consult. Also, the policy context has an impact on how many authorities or actors are involved in the governance arena and with implementation of flood risk measures. In the case of Milton Keynes, national legislation appointed five authorities which are responsible for managing the risk and are therefore most relevant for this research. Also, the amount of qualitative knowledge which can be abstracted from interviews strongly differs per interviewee and their respective professional rank. In Rotterdam one interview with a senior advisor on flood management and climate adaptation, provided a substantial amount of information, which could be the equivalent of three other interviews conducted in Rotterdam. This example connects to the existing debate on data saturation wherein the discrepancy between information quality and information quantity and their respective importance becomes vivid (Fusch & Ness, 2015).

4.2.4. External socio-economic and geographical context.

Another limitation of this study can be found in the comparative analysis, wherein the socio-economic and geographical context was not included. The geographical context is highly important because it has a direct impact on flood risk characteristics and eventually on the policies formulated to deal with the issue. The socio-economic and geographical context also have a great influence on the capacity to govern flood risk and the level of urgency experienced in relation to flood risk (Chakraborty et al., 2005). If a country or city is located below sea level, it means that due to this geographic context, flooding occurs more often and poses a higher risk and therefore becomes a more urgent problem for the national and local governance arenas to solve, compared to a country or city which is located in the highlands. A city located near or in a river delta will also experience a higher level of urgency to govern flood risks than cities located more land inward due to the experienced level of flood risk (Mustafa, 1998). The socio-economic context has an influence on the vulnerability on the overall capacity of cities to govern flood risk (Few, 2003). This research does not denounce the importance of these factors, however, due to time and resource constrains, this thesis did not include other context factors besides the policy context. It was also in the interest of the research that a certain context focus was applied. Because of this focus on the policy context, the extrapolation of these results should be applied to other European member states only. Other countries which lack European policies (EU WFD & EU FD) and the accompanied ratification process are hard to extrapolate the results on, but can however be compared with these results for evaluative reasons or to examine countries in contrast with each other in regard to their respective flood risk governance and policy frame.

4.2.5. More research needed

It would be very interesting to conduct this study again after a period of five years, when the Brexit might have been realised, in order be able to assess the impact this segregation would have on U.K. flood risk policy and the capacity of U.K. cities to govern their flood risk. It can be valuable to evaluate the importance of supranational policies for national and local flood risk governance capacities. These findings can help justify the formulation of supranational policies and the European resources spent on this, on the other hand the results could also provide the necessary feedback or insight in improvement points in order to make these supra national policies more effective. By applying the governance capacity framework to more cities, the existing data base can be expended, which would foster more opportunities to compare different cities and to expand our knowledge on flood risk governance. Also, new insights in the barriers and enablers of the capacity of cities to govern their flood risk could be created by accessing this database and that's why it is important that future research on the governance capacity of flood risk complements to this existing database.

Conclusion

To what extent do the European, national and regional policy frames enable cities to improve their capacity to govern flood risk challenges in the UK and the Netherlands?

In order to answer this question a policy analysis was developed to analyse the relevant European flood risk policies and the national and regional flood risk policies in both the United Kingdom and the Netherlands. Six assessment criteria have been identified and applied to analyse the impact of European, national and regional policies on the ability of cities to address flood risk.
In both countries, the European policy frame encouraged the ability of cities to address flood risk by obligating the production of flood risk assessments and flood maps. Moreover, supranational policies also enabled countries to assess the individual experienced risk which raised awareness and proved to incentivise the formulation and implementation of flood risk policies at the national and regional level. Although the supranational policies had to be ratified into national policy, national policies were found to be rather different. Dutch national policy included exemplary measures and guidelines which were exceeding the obligations set in European policy. The geographical vulnerability for floods may explain the high ambition of the Dutch national policies. It exemplifies that there is room to manoeuvre within the European imposed policy frame providing countries with much freedom to address flood risk in their national policy. The national policy frame of the United Kingdom complies with European flood risk policy but no substantial efforts have been made to go beyond these obligations. The Dutch national policy frame creates a centralised way of addressing flood risk wherein there is little room for inter-sectorial approaches, which also does not promote agents of change in the decision-making process. However this centralised approach does enable long-term funding which is crucial for the implementation of long-term flood risk policies and helped ensured continued water safety. In Milton Keynes the imposed policy frame greatly divided the governance network and allocates fragmented responsibilities to stakeholders addressing flood risk, thus hampering the ability to govern flood risk. The policy frame also fosters the creation of useful knowledge in the UK and this can contribute to awareness and through this form of learning, effective policies and measures can be made.

Secondly, the local capacity to govern flood risk has been analysed for the city of Rotterdam in the Netherlands and Milton Keynes in the United Kingdom. Both analyses revealed some noticeable differences. Milton Keynes experienced the highest number of limiting conditions and should focus on strengthening the awareness condition as this leads to more effective policy implementation, and at the same time justifies more adequate policy formulation. In Rotterdam the awareness is also relatively low, but it does not seem to have an impact on policy implementation or formulation. In regards to useful knowledge, both cities had encouraging information availability and transparency scores, but this is seemingly not a guarantee for high awareness. Smart monitoring is a governance condition which is not very well developed in both cities and should be improved by both cities in order to strengthen their capacity to govern flood risk. Ambitious and realistic management is a condition which encouraged the governance capacity of both cities. The multi-level network potential should be improved by both cities as integrated and inter-sectorial flood risk management approaches are lacking. Responsibilities regarding individual projects in both cities should be set in legal agreements and responsibilities in the governance arena should be shared in order to strengthen this condition for Milton Keynes. Milton Keynes Council should attain a more proactive role in flood risk governance and create incentives for developing flood risk management pilot projects. Financial continuation proved to be a limiting condition for Milton Keynes due to austerity measures and experimentations with new local funding schemes should commence in order to ensure long-term policy implementation and to strengthen the city's capacity to govern flood risk. The low local sense of urgency also had a limiting effect on the preparedness of Milton Keynes, and because a situation first has to be perceived as a problem in order for city to take adequate measures, the city did not show any encouraging signs of

being prepared. The implementing condition was had an encouraging impact on the governance capacity of Rotterdam, however improvements in capacity to execute contingency and evacuation plans can make the city even more prepared.

Finally, there is a difference in the degree of importance of governance conditions and indicators between cities in the UK and the Netherlands as a result of policy frames. Both the governance capacities of Milton Keynes and the UK policies have received a relatively low score meaning that some capacities become even more important in order for UK cities to be able to effectively govern their flood risk. In the case of Milton Keynes, financial viability (condition 8) and specifically financial continuation (Ind. 8.3) is not being ensures via the policy frame and austerity measures have further diminished long term funding. Awareness (condition 1) is very important because in the UK policy frame some responsibilities have been allocated to a local level and the implementation of measures in depending on local stakeholders and their level of urgency (Ind. 1.2). Because the condition awareness had a limiting influence on the capacity to govern flood risk and because the imposed policy frame is very reliant on awareness in order to be effective, this condition is very important for Milton Keynes. Management ambitions (condition 5) and more specifically, management cohesion (Ind 5.3) is a very important condition which should be strengthened because the imposed policy frame of Milton Keynes contributes to an overly fragmented governance network. In Rotterdam a centralised authority and legal obligations, both set up in the policy frame, has been found to be limiting the Multi-level network potential. There for the city is not yet capable to produce integrated policies or inter-sectorial projects on a large scale. Although the implementing capacity is very encouraging in Rotterdam due to a comprehensive policy frame which promotes effective use of policy instruments and statutory compliance, Milton Keynes does not enjoy these encouraging conditions. The local authorities should develop adequate policy instrument and implement effective compliance mechanism to promote more statutory compliance.

The European policy frame has had tremendous influence in the capacity of UK cities to govern their flood risk, by mandating the formulation of local policies and flood risk documents, thus improving their individual capacity to govern these risks. In the Netherlands, historic context had enabled effective flood risk policies to be in place before the implementation of European policies, promoting flood risk governance of Dutch cities ahead of time, making them a somewhat unique case. National policies, in the case of UK have been very much the result of ratification of European policies; nevertheless they contributed to the capacities of cities to govern their flood risk, by allocating responsibilities and making actors accountable for governing flood risk. Dutch national policies have exceeded the obligations and norms dictated by European flood risk policies and have created an excellent policy frame to ensure national water safety. This national policy frame has enabled cities to improve their capacities to govern flood risk by ensuring financial continuation of local flood risk policies to a great extent and by creating a governance arena wherein responsibilities are shared. Regional policy frames were of less importance in the Netherlands due to is highly centralised policy frame. In the UK regional policies also helped cities to govern their risk, for example in the case of Milton Keynes these policies helped apply a catchment approach to the issue of flood risk, which enabled more effective governance at a city level. Policies are very important and help improve the capacity of cities, however if these are not sufficient, cities have the ability and freedom to strengthen their individual governance capacity if this is deemed necessary by the local authorities.

This research has allowed a comparison to take place between two west European cities capacity to govern flood risk, it enabled the assessment of two policy frames and their respective influence in the flood risk governance of each city. Without this comparing element these insights would not have been able to be produced.

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Utrecht University

KWR Watercycle Research Institute

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