

Living with floods

A discursive approach to analyze the cultural differences in flood management between New York and Rotterdam

CNN, november 2012 **Climate change is back on the table** Updated November 7, 2012
New York (CNNMoney) - Climate change is once again a hot topic in the United States. Hurricane Sandy brought the issue back into the spotlight just days before the presidential election. Pundits were quick to note the irony of a massive superstorm...

New York's neglected infrastructure fails Updated November 1, 2012
It should come as no surprise to anyone that New York's infrastructure wasn't up to Hurricane Sandy. What happened in New York was not all that different than what's happened in other places hit by freakish weather... CNN, november 2012

BBC, november 2009

The Netherlands leads battle against rising sea levels

Science & Environment / 27 November 2009
... could happen tomorrow," says Piet Dircke, professor of Urban Water Management at Rotterdam University. Country at risk Hurricane Katrina -- was...

Nasleep Sandy levert Nederland werk op ...

Ingenieurs spelen in op het beteugelen van de gevolgen van toekomstige orkanen "Hoe kan je voorkomen dat de enorme schade die de orkaan Sandy in oktober heeft aangericht, nog een keer optreedt?", zegt Mathijs van Ledden van Royal HaskoningDHV. ...

09/01/13 00:00

Trouw, januari 2013

Noordoosten VS bereidt zich voor op Sandy ...

Het noordoosten van de Verenigde Staten bereidt zich koortsachtig voor op de komst van de orkaan Sandy... is nog niet te voorspellen waar de orkaan precies aan de oostkust aan land gaat komen, maar mogelijk is het in de regio van New York en New ...

28/10/12 09:19

AD, oktober 2012

Holland copes with threat of flood

Updated September 13, 2005.

Flat, surrounded by water, and like New Orleans, largely below sea level, Holland lives with the threat of flooding from the North Sea.

CNN, september 2005

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Abstract

The effects of climate change in combination with urbanization have made flood management more important in the last decade. Urban coastal cities deal with an increase of climate extremes and a rising sea-level which likely causes an increase of floods. How urban coastal cities deal with these floods can be different, this is due to cultural differences and the kind of events a city has to deal with. This results in various flood management discourses visible around the world. This thesis zooms in on two urban coastal cities, New York and Rotterdam, two very similar cities but at the same time there are also differences, for example in the sense of urgency. In this thesis it will become clear that the flood management discourse in New York and Rotterdam differ from each other and develop differently, influenced by cultural differences as well as the type of events. This is analyzed with a newspaper analysis and a policy field analysis, as the use of language is important in this thesis. In the end, the thesis will provide information on the development of the flood management discourse, described with the shift that has taken place in flood management by looking at New York and Rotterdam. It seems that the shift in flood management is more a shift in language instead of a shift in practice as well.

Keywords: *flood management, discourse, culture*

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Chapter 1: Introduction

1.1 Background

“Climate change is becoming widely recognized as the key global challenge of this century”, according to Intergovernmental Panel on Climate Change (Hamin and Gurran 2009, p. 238). We need to think about climate change as it likely causes a rising sea-level, the increase of rainwater and an increase of climate extremes. Gornitz et al. (2001) argues that, *“by the end of the century, increases in sea level rise of two to five times the present rates could lead to inundation of low-lying coastal regions, more frequent flooding episodes [...]”* (p. 61). Coastal areas are vulnerable. It is plausible that climate change, eventually, will lead to more floods in the coming decades. Examples of the last decade demonstrate this, like the tsunami that hit Indonesia (2004), hurricane Katrina in New Orleans (2005), the tsunami that hit Fukushima (2011), and hurricane Sandy in New York (2012). The impacts were enormous.

But these disasters cannot only be subscribed to climate change. *“The Intergovernmental Panel on Climate Change, comprised of top climate scientist from around the globe, has reached consensus that human activities have contributed significantly to global climate change.”* (Boykoff and Boykoff 2007, p. 1190) The population is increasing in urban coastal areas. *“Globally, approximately 400 million people live [...] within 20 km of a coast”* (Gornitz et al. 2001, p. 61). The increasing population in urban coastal areas makes the area vulnerable, for example when it comes to economic impacts (Smit et al., 2011). The economic heartland of countries with a coastline is mostly located at the coast (Oosterberg et al., 2005). After hurricane Sandy hit New York, Wall Street was down for a few days. The costs were estimated at 50 billion dollar (ANP, 2012a). Another example is the Netherlands, according to Terpstra and Gutteling (2008), the economic value as well as the population in the coastal area of the Netherlands has increased over the past decades. Important cities like Rotterdam, Amsterdam and The Hague are located in a coastal area.

The combination of climate change and urbanization will have an impact on urban coastal areas, floods will likely increase. That is also why flood management has become more important. One way to defend a coastal city from flooding is the implementation of flood defenses. Estimations have been made about the amount of floods that will occur with the current flood protection systems in the Netherlands and the United States. The amount of floods that can occur in the United States is a flood once every 100 years. In the Netherlands, a flood can occur once every 10.000 years. But the flood defenses are failing. Water safety norms are not up to date (Loucks et al., 2008). According to

Loucks et al. (2008), a flood once every 100 years or a flood once every 10.000 years cannot be guaranteed anymore and people are not aware this.

The mass media can play a role in making people aware of not only water safety norms, but also climate change, flood management and disasters as the mass media plays an important role in providing information to the people. *“What average citizens and officials expect about disasters, what they come to know of ongoing disasters, and what they learn from disasters that have occurred, are primarily although not exclusively learned from mass media accounts.”* (Disaster Research Center 1992, p. 2) This is also visible in the article of Houston et al. (2012). *“[...] when a disaster occurs, the role of the mass media is understood to include communicating whatever warning is available (if any), providing a description of what occurred, keeping the public informed post event [...]”* (p. 607). It is the media who provides information to the people about disasters, and also the effects of climate change.

Coastal cities face the effects of climate change in combination with urbanization, which likely causes more floods in the coming decades in urban coastal areas. This thesis will zoom in on two coastal cities, New York and Rotterdam. The two cities are very similar, but at the same time there are also differences. An example is the sense of urgency, the United States deals with events like hurricane Katrina (2005) in New Orleans and hurricane Irene (2011) and Sandy in New York. The Netherlands had to deal with a few events in the past, the big flood disaster in 1953 and the flooding of the river (Rijn) in 1993 en 1995. New York and Rotterdam will be compared with each other, looking at the way the city deals with floods, how this view has developed and do different events as well as culture have an influence on this development.

1.2 Problem statement & research objective

New York and Rotterdam are urban coastal cities who face the effects of climate change in combination with urbanization. The effects of climate change will likely cause more floods because of a rising sea-level and more climate extremes, while urbanization has influence on the impact of a rising sea-level and climate extremes. As a result, flood management is becoming more important. The literature reveals that there are different traditions in flood management, which is clearly visible between the Netherlands and the United States, whereby the Netherlands seems to focus on prevention and the United States seems to focus on preparedness. The different flood management traditions between the Netherlands and the United States leads to a different flood management discourse. A discourse is a *“group of statements and practices that structure the way we think about things”* (Flowerdew and Martin, p. 264). In this case it means the way we think about flood

management. This thesis will give insight on how the flood management discourse in New York and Rotterdam has been developed over time, looking at three different elements, the perceptions on climate change, as the effects of climate change are important in flood management, the different measures taken in flood management, with a closer look at the water safety norms and last the public-private divide, the involvement of public and private actors. This leads to the following research question for this thesis:

- Comparing New York and Rotterdam, what is the influence of culture and events related with floods on how the flood management discourse has been developed, looking at the perceptions on climate change, measures taken in flood management and the public-private divide?

The end result will give insight in the development of flood management discourse, by comparing New York and Rotterdam. Urban coastal cities can draw lessons from the way flood management develops in cities and what the influence of culture and certain events is on the flood management discourse.

1.3 Relevance of the thesis

Climate change is a hot topic, especially the effects of climate change. With the effects of climate change and urbanization, there is a lot going on in urban coastal areas. It is likely that the amount of floods will increase because of the increase of climate extremes and a rising sea-level. The literature reveals that there are various flood management discourses, but how these discourses have developed differently is not visible. This thesis will deepen into existing knowledge on flood management discourse and provide insights in the development of various flood management discourses by collecting data from newspaper articles and the policy field.

1.4 Methodology

To get an answer on the research question, choices have to be made in the methodology. These choices can be used in defining the methods useful in this thesis, which will be described in chapter three.

This thesis will have a case study approach. According to O'Leary (2010), a case study refers to "*a method of studying elements of the social through comprehensive description and analysis of a single situation or case, e.g. a detailed study of an individual, setting, group, episode, or event*" (p. 174). Two cases studies, New York and Rotterdam, will be compared with each other by looking at the difference in the development of the flood management discourse. Both cities are very similar, but at

the same time there are also differences. A case study approach is needed to get an answer on the research question. Therefore, it is relevant to do a case study approach.

Besides a case study approach, this thesis will have a discursive approach. The development of the flood management discourse is accompanied by the implementation of new concepts in language, like the deltadyke. Wetherell et al. (2001, in Van den Brink, 2009) argues that central to the discursive approach is the study of language in use. The role of language is important. This is for example visible in the mass media, who plays an important role in providing information on climate change, flood management and disasters. Therefore, this approach is useful for analyzing the flood management discourse in newspaper articles and for the policy field.

1.5 Thesis structure

Chapter 1 gives an introduction on the subject of this thesis with a background, problem statement, research objective and the research question. Furthermore, the methodology is briefly discussed. The thesis structure is given as a guideline for the thesis.

Chapter 2 will provide the theoretical background of this thesis. It explains three important concepts, culture, discourse and flood management. The chapter will explain what these concepts mean and how these concepts are related to each other. The chapter will end with a conceptual framework, which will be the basis for the empirical chapter. The conceptual framework will consist of four steps that will be taken in this thesis, the first step is defining the tradition in flood management, the second step refers to newspaper analysis, the third step refers to a policy field analysis and the last step compares New York and Rotterdam with each other.

Chapter 3 reveals the methods used for this thesis. Furthermore, the chapter shows how the methods have been used in the empirical chapter, using the steps of the conceptual framework.

Chapter 4 and chapter 5 are the empirical chapters of this thesis. Chapter 4 will provide the data collected for the case study New York and chapter 5 will provide the data collected for the case study Rotterdam. Both chapters start with a short introduction on the case study and on the country, the location, institutions and the tradition in flood management, according to the literature. After the introduction and the tradition in flood management, the development of the flood management discourse will be revealed, looking at the perceptions on climate change, the measures taken in flood management and the public-private divide. The chapter will end with an overview of how the flood

management discourse has been developed over time and what the influence of culture and certain events is on flood management.

Lastly, chapter 6 gives a conclusion, whereby both case studies will be compared to each other. The chapter will give conclusions and recommendations and it will give an answer to the research question. Furthermore, the chapter will provide a reflection on the theoretical and methodological parts of the thesis.

Chapter 2: Culture, discourse and flood management

2.1 A short introduction on the flood management discourse

Flood management differs between countries. As Pottier et al. (2005) points out, *“the nature of flood risk management in different countries revolves around their legislative and administrative systems, their cultural contexts, and the types of floods that they experience”* (p. 2). Legislative and administrative systems refer to the government and laws, the institutions. Policies can be executed on various levels, local, regional, federal, state or national. Furthermore, each country has their own laws. Also culture influences flood management, because of a different systems of meaning. Cultural differences will therefore lead to different outcomes in the development of flood management. As Pottier et al. (2005) argues, one solution can have different outcomes because of the differences in culture and geography. Furthermore, a country is path-dependent. History influences the way a country deals with floods. Events, like hurricanes, have an impact on a country, as every country deals with different kind of events. In the end, institutions, culture and events influence the flood management discourse, which results in various flood management discourses around the world. The development that has taken place in flood management the last decades will therefore also probably have a different outcome between countries, between various flood management discourses.

Chapter 2 will give insight on the concepts of culture, discourse and flood management. The chapter will end with a summary of this chapter and the conceptual framework. The conceptual framework consists of four steps which will be taken to do this research.

2.2 Flood management: culture matters

The previous section indicated that culture is an important aspect in flood management. It influences the flood management tradition in a country, the way flood management is carried out. Knox and Marston (2007) define culture as *“a shared set of meanings that are lived through the material and symbolic practices of everyday life”* (p. 174). Culture helps to make sense of our daily lives and influences our daily lives. Culture gives meaning to material as well as symbolic practices (Knox and Marston, 2007). Stuart Hall (1995) defines culture in a similar way, *“the systems of shared meanings which people who belong to the same community, group or nation use to help them interpret and make sense of the world”* (De regio in de culturele geografie. Groote, P. and Druiven P. 2005, p. 127). So, culture is a way to give meaning and values to the surrounding world, the place where we live. It

has to be said that culture is not tied to a specific place, but it is tied to a nation, society or group of people.

"[...] culture is not something that is necessarily tied to a place and thus a fact to be discovered. Rather we regard the connection among people, places, and cultures to be social creations that can be altered and therefore must be explored in order to be understood." (Knox and Marston 2007, p. 174)

This is also visible in the view of Pottier et al. (2005), who argued that culture and geography have an influence on flood management. One solution can have different outcomes because of the interaction among people, places and cultures. Knox and Marston (2007) describe this as cultural geography which *"focusses on the way in which space, place and landscape shape culture at the same time that culture shapes space, place and landscape"* (p. 175). The quote reveals an interaction between culture and space, place and landscape. Knox and Marston (2007) also argue that culture shapes the identity of a place and of a group of people, known as the culture system. The culture system includes shared history, territories, language and more (Knox and Marston, 2007). Especially shared history can have an impact on culture. According to Hofstede (2002, in Justitiële verkenningen, 2002), cultural differences have emerged throughout history:

"The evidence of cultural differences between countries is rooted in the history. They are partially mirrored in the institutions (family, school, church, business organizations, governments, laws and jurisdiction) of the involved countries, and in the ideas that are popular in that country. The law in a country is culturally determined. Institutions contribute to the preservation of the culture from which they are evolved. That is why cultures and cultural differences are surprisingly stable." (Justitiële verkenningen 2002, p. 10)

The impact of history on culture is still visible nowadays, as institutions for example derive their information from earlier years and that is how the culture is preserved. It also reveals that countries are path-dependent, *"past events influence future events"* (Mahoney 2000, p. 510), which in the end results in cultural differences. Therefore, flood management, which is influenced by culture, according to Pottier et al. (2005), will be different between countries.

To conclude, culture is about a shared set of meanings which helps to make sense of the world. Culture influences a place as well as a place influences culture. Culture includes a shared history, language and more which shape the identity of a place and of a group of people. Path-dependency is thereby an important aspect, as past events influence future events. In the end, cultural differences result in various flood management traditions.

2.3 From cultural differences towards various flood management discourses

A way to identify cultural differences is by looking at discourse. Described by Flowerdew and Martin (2005), discourse refers to *“groups of statements and practices that structure the way we think about things”* (p. 264), in this case the way we think about flood management. *“Discourses are systems of meaning through which social reality is produced and made real, and social interactions can only be understood fully in terms of the discourses that give them meaning.”* (Van den Brink 2009, p. 26) The flood management discourse thereby gives meaning to how flood management is understood and how people make sense of it. The discourse consists of ideas and concepts which are conceptualized as a system of meaning. According to Hajer (1993), discourse can be seen as *“an ensemble of ideas, concepts, and categories through which meaning is given to phenomena”* (p. 45). Discourse is thereby not restricted to mental phenomena. The meaning that is given to phenomena allows social life to be conducted (Howarth, 2000 in Van den Brink, 2009). People make sense of phenomena and give meaning to phenomena to understand the world around us. According to Hajer (1993), discourse *“[...] forms the context in which phenomena are understood and thus predetermines the definition of the problem”* (p. 46). So, flood management discourse forms the context in which phenomena are understood, which have to do with flood management, and thus flood management discourse predetermines the definition of the problem. This problem can be understood differently between countries, because of cultural differences.

This thesis describes the development of flood management discourse. *“A discourse always invokes a temporary closure: it fixes meaning in a particular way, but it does not dictate that meaning has to be fixed in that way forever.”* (Van den Brink 2009, p. 27) Discourse changes over time. It is possible that part of the discourse is fixed, like history or culture, but the other part of discourse will be subject to change. Events like hurricanes could have an impact on the flood management discourse. Hajer (2006) argues that discourse *“is produced and reproduced in an identifiable set of practices”* (p. 46). At some point, a discourse will try to dominate and it will become accepted by people. But a certain discourse will not dominate forever, as a discourse changes because of certain events and moments. This is visible in the flood management discourse, where floods, hurricanes or other events and moments have an impact on the flood management discourse. The result is that the previous dominant discourse is not accepted anymore, people start to give different meanings to the phenomena.

2.3.1 Discourse structuration vs. discourse institutionalization

According to Hajer (2005, in Van den Brink 2009), discourse has a two-step procedure for measuring the influence of a discourse, involving discourse structuration and discourse institutionalization.

Discourse structuration occurs when a discourse starts to dominate the way a society conceptualizes the world." (Hajer 1993, p. 46) A discourse starts to dominate, when it is commonly accepted and used by the society. After discourse structuration has taken place and the discourse can be seen as successful, *"it will solidify into an institution, sometimes as organization practices, sometimes as traditional ways of reasoning"* (Hajer 1993, p. 46). When discourse structuration as well as discourse institutionalization has taken place, a particular discourse can be seen as dominant. The discourse is accepted by the people and at the same time the discourse is visible in institutions, in policy documents. Discourse involves both language and practice, whereby discourse structuration can be linked to language and discourse institutionalization can be linked to practice. It is about the incorporation of concepts and ideas in language and the institutionalization of these concepts and ideas in practice, which in the end will result in a dominant flood management discourse (Van den Brink, 2009).

Especially the use of language is important in this thesis to describe the development of flood management discourse. Hajer (1993) argues that language has shifted from a *"neutral system of signs that described the world"* (p. 44), towards language as a *"medium, a system of signification through which actors not simply describe but create the world"* (p. 44). Biria and Mohammadi (2012) agree and point out that *"a text is merely the tip of the iceberg and it is the responsibility of the discourse analyst to uncover the hidden meaning in the text"* (p. 1291). This quote reveals as well that language is no longer a way to describe the world, but it has changed to a means of creating the world. Language is becoming more important as it can influence people. In the end, the media decides what people get to know about the effects of climate change, flood management and disasters. Therefore, it is interesting to see if the concepts and ideas in language, in this case in newspaper articles, are incorporated and institutionalized in practice, in the policy field of flood management.

2.3.2 *Newspaper articles vs. the policy field*

This thesis will analyze newspaper articles and the policy field of flood management to describe the development of flood management discourse. Language is an important tool in describing and creating the world. Therefore, language is also an important tool in describing and creating ideas and concepts in flood management. By looking into the policy field it is visible if the language is institutionalized in practice.

Discourse structuration can be linked to language. Therefore this thesis takes a look into newspaper articles. Discourse analysis of newspaper articles is linked to newspaper analysis and framing.

“Framing deals with how a particular story is presented to the public, and starts from the premise that each story has the potential of being presented in many different ways.” (Dilevko 1998, p. 56) Dilevko (1998) also refers to the work of Robert Entman. Entman states that framing is *“select[ing] some aspects of a perceived reality and mak[ing] them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation”* (Dilevko 1998, p. 56). The mass media can include and exclude text, which influences what people get to read and in the end how the world will be created by those people. *“By selecting what to include and what to exclude from a story, the news media frame a story; that is, the media limit or define the story’s meaning and thereby shape people’s interpretation of that story.”* (An and Gower 2009, p. 108) Vreese (2005) agrees, and states that people turn to the news daily. It is an important institution in people’s daily lives and therefore newspaper articles can have an impact on people. But, Fung et al. (2011) argue that people actively interpret information and create opinions about certain subjects, like climate change or flood management. People give meaning to certain subjects and make sense of it.

Discourse institutionalization can be linked to practice. Therefore this thesis takes a look at the policy field of flood management. It reveals if concepts and ideas used in language are incorporated and institutionalized in practice. An idea or concept can be commonly accepted by the society, which eventually leads to language solidified into institutions (Hajer, 1993). Institutions refer to governments, laws, policies, organizations (Justitiële Verkenningen, 2002; Pottier et al., 2005). It refers to the way flood management is practiced. Language solidified into institutions means that what is commonly accepted by the society is also visible in policy documents, laws etc. A discourse has become dominant.

To conclude, a dominant flood management discourse occurs when ideas and concepts are commonly accepted by the society and at the same time these ideas and concepts are solidified into institutions, that is in the policy field of flood management. Cultural differences are visible in the flood management tradition which leads to various flood management discourses between countries.

2.4 A shift in the flood management discourse

Various flood management discourses exist. But apart from the various discourses, influenced by the cultural differences between countries, the literature reveals a shift in thinking about flood management. The amount of floods is increasing, likely caused by the effects of climate change in combination with urbanization. Urban coastal areas are at risk. The increasing risks have resulted in

in a shift in thinking about flood management. In general, a shift has taken place from a technical approach in flood management focused on hazard reduction, towards flood risk management. The technical approach refers to hazard reduction conducted by the government. Flood risk management is referred to a more holistic approach to flood management, with the integration of many actors and a focus on all concepts in flood management, hazard reduction, vulnerability reduction and exposure reduction (Hutter, 2006; Meijerink and Dicke, 2008; Oosterberg *et al.*, 2005).

2.4.1 Hazard reduction, vulnerability reduction and exposure reduction

Part of the shift in flood management is the measures taken to protect an urban coastal city. Three distinctions can be made, hazard reduction, vulnerability reduction and exposure reduction, according to Oosterberg *et al.* (2005) and Meijerink and Dicke (2008). Hazard reduction refers to keep floods away from urban areas. Measures which can be linked to hazard reduction are building dykes or storm surge barriers, but also soft infrastructure by making more space for the water. Vulnerability reduction is about preparing urban areas for floods. Floods are accepted and a country cleans up afterwards. The focus is on early warning systems, evacuation plans and adjusting buildings and infrastructure to flood risks. The last distinction made is exposure reduction, which refers to keep urban areas away from floods. Houses and buildings are relocated and living in floodplains is prohibited (Meijerink and Dicke, 2008; Oosterberg *et al.*, 2005). The three distinctions are visible when looking at the tradition in flood management as well as the development of flood management.

In the past, flood management was aimed at physical interventions, like building dykes and making buildings and infrastructure capable of dealing with floods, as Godschalk (2003) argues. Flood management was aimed at predict and control. When a flood occurred, people came into action. Protection, for example a dyke, was sufficient at that particular point, but for the future more needed to be done (Godschalk, 2003; Pahl-Wostl, 2007). Hutter (2007) states that flood management has changed from *“controlling the flood hazard to safety standards and flood management”* to *“understanding and managing the flood risk”* (p. 280). Meijerink and Dicke (2008) agree and argue that, *“whereas policies used to be aimed at fighting the water by means of ‘hard engineering’, new policies try ‘to work with nature’ or ‘to live with the water’”* (p. 500). In the past, flood management seemed to focus on hazard reduction, by building dykes, but it also seemed to focus on vulnerability reduction, as flood management was aimed at predict and control. Nowadays, flood management seems to focus on hazard reduction as well, but the focus has shifted from the implementation of hard infrastructure to the implementation of soft infrastructure by making more space for water. *“The awareness amongst experts and policy makers of climate change and the increasing flood risks,*

however, have lead to the development of new modes of flood protection, which many consider nothing less than a paradigm shift in water management.” (Meijerink and Dicke 2008, p. 500) Working with nature and living with water becomes more important.

Resilience can be linked to the shift towards flood risk management and the holistic approach, by focusing on all three strategies, hazard reduction, vulnerability reduction and exposure reduction. Use of the term resilience has increased in the last decade. According to the United Nations Office of Disaster Reduction (UNODR, 2007) resilience is *“the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions”*. The three distinctions are visible in the concept of resilience, *“in this approach flooding is allowed in certain areas, while at the same time the adverse impact of flooding is minimized by adapting the land use. Such strategies are called resilience strategies. They rely on risk management instead of on hazard control.”* (Vis et al. 2003, p. 33) In the past, flood management was focused on resistance, hazard reduction. *“Such measures aim to reduce the flood hazard, i.e. the frequency of flooding. Flood risk management strategies based on this approach are called flood control strategies or resistance strategies.”* (Vis et al. 2003, p. 33) Now, resistance has become part of resilience, the holistic approach to flood management.

2.4.2 *The public-private divide, the involvement of actors*

Another part of the shift in flood management has to do with the involvement of actors. Flood management shifted from a technical approach towards a holistic approach, which means that not only all different measures taken in flood management have to be taken into account, but it also means that new public and private actors are involved.

In the past, flood management was considered a public good. Meijerink and Dicke (2008) argue, *“For a long time, flood management was considered as the prime example of a pure collective good. In many countries, it has been the exclusive task of the state.”* (p. 499) This view has changed, *“Recently, there have been changes in flood management: there are new rationales underpinning flood management, new public and private parties are involved and generally speaking, flood management tends to be more decentralized than 15 years ago.”* (Meijerink and Dicke 2008, p. 499) More public and private actors are getting involved in the process of flood management, which also can be seen as a shift from government to governance, or as Hutter (2006) puts it, from government to *“integrated governance”* (p. 234). The shift has resulted in a shift in the public-private divide, instead of the government as the only provider more public and private actors are getting involved.

There is a difference between flood management as a public good and flood management as a private good. Meijerink and Dicke (2008) argue that, *“if a good is a pure public good, the state is the only logical provider of this good, and a pure private good is produced best by the market”* (p. 501). In the past, in most countries, the state was responsible for the dykes and dams. No one got excluded from the protection against floods. The role of the state, and therefore flood management as public good, can get more complicated if the state makes exceptions. Important historical buildings, for example, can get a better protection than other buildings or infrastructure. Considering flood management as a private good, produced best by the market, can result in differentiation. One neighborhood can get better protection than the other neighborhood (Meijerink and Dicke, 2008). What would be better is difficult to say, as the outcomes for flood management as a public or as a private good will be different for each country, because of cultural differences between countries.

To define if flood management is a public or a private good, the following question raised by Meijerink and Dicke (2008) can be important, *“What are the responsibilities of government agencies at various levels of government and what role do private parties, such as land developers, land owners, insurance industries and individual citizens, play?”* (p. 501) It is important to identify which actors are involved. Schelfaut et al. (2011) argues that *“the coordination of governmental institutes at all scales is essential for an effective flood risk management in general”* (p. 828). Furthermore, *“mapping the relevant actors and their responsibilities can clarify the situation and help integration between decision-makers across sectors and scales”* (p. 830). It is not only important to identify the involved actors, but these actors also have to communicate and cooperate with each other. Meijerink and Dicke (2008) pointed out that flood management is more decentralized than 15 years ago. Therefore, according to Schelfaut et al. (2011), *“a bottom-up involvement is needed where local knowledge and concerns of local communities are translated back into flood risk management. Local communities should become an active player in the whole, rather than merely executing higher-level decisions.”* (p. 830) Local communities have the best knowledge for situations happening at that certain place, so the population should be involved. This also reveals that the public-private divide has changed, as more actors are involved.

To conclude, the increasing risks for urban coastal cities have resulted in a shift in flood management. In general, a shift has taken place from a technical approach in flood management towards a holistic approach in flood management. From the focus on hazard reduction, predict and control towards the integration of all concepts, hazard reduction, vulnerability reduction and exposure reduction, focusing on living with water, working with nature and the involvement of more actors as well as a better communication between those actors. If this shift in flood management is

visible in newspaper articles and in the policy field, depends on a country. Cultural differences between countries are leading to various flood management discourses, which in the end leads to different outcomes for each flood management discourse.

2.5 Conceptual framework

The previous sections have explained the most important concepts in this thesis, culture, discourse and the shift in flood management. All these concepts are related to each other and have influence on the way the flood management discourse develops in a country.

2.5.1 Concluding

Pottier et al. (2005) made clear that flood management in a country is influenced by culture. Differences in culture and geography can give different outcomes between countries. Culture refers to the way people give meaning and values to the surrounding world. As Knox and Marston (2007) argue, culture shapes the identity of a place and of a group of people, known as the culture system. This is influenced by shared history, language, beliefs etc. Hofstede (2002, in *Justitiële Verkenningen*, 2002) as well argues that cultural differences between countries are rooted in the history. These cultural differences are visible in the institutions, like schools, governments and organizations.

Eventually, cultural differences lead to flood management traditions. A way to identify these cultural differences is by discourse. Discourse forms the context in which phenomena are understood, it predetermines the definition of the problem (Hajer, 1993). This problem can be understood differently between countries, because of cultural differences. A discourse will occur and dominate if it is commonly accepted by the people. But different events, like hurricanes, can have an influence on the dominant discourse. As Hajer (2006) argues, discourse is produced and reproduced in an identifiable set of practices. People give meaning to discourse, in this case flood management discourse, all the time and therefore it can also change.

Discourse can be divided into discourse structuration and discourse institutionalization, whereby discourse structuration can be linked to language and discourse institutionalization can be linked to practice (Van den Brink, 2009). Discourse structuration occurs when a discourse starts to dominate. Ideas and concepts are commonly accepted by the society. But a discourse can only be called dominant, if these ideas and concepts commonly accepted are also solidified into institutions, like the government, laws and policy documents. This can be referred to discourse institutionalization. There are differences between dominant flood management discourses, because of cultural differences between countries.

Apart from various flood management discourses, influenced by culture, a shift has taken place in flood management from a technical approach to a holistic approach. This means a shift in the measures taken in flood management as well as a shift in the public-private divide, the involvement of actors. Depending on the country, the shift in flood management is visible in the flood management discourse, in language and practice.

2.5.2 From the theoretical background to the empirical analysis

The theoretical background has provided information for doing further research. All the concepts described in this chapter are useful for the empirical analysis. The thesis will make use of two case studies, New York and Rotterdam. Four steps are taken in this thesis to get to the end result.

The first step in identifying the flood management discourse in New York and Rotterdam is defining the tradition in flood management. Chapter 2 revealed that culture influences the flood management discourse, which results in various flood management discourses. With a secondary literature study, the cultural influence on the flood management discourse will become clear. Countries are path-dependent and therefore traditions are well established.

Step 2 refers to discourse structuration. By doing a newspaper analysis, data will be collected of the language that is used in newspaper articles. The mass media has an important role in providing information about climate change, flood management and disasters. Furthermore, the shift in flood management consists of many new concepts, ideas and terms which can be presented in newspaper articles. Step 2 will describe the image that is created of the development of the flood management discourse in newspaper. It reveals if a shift has taken place in flood management as well as the impact of events on flood management.

Step 3 will consist of discourse institutionalization. By doing a policy field analysis, the data collected will reveal if language is solidified into practice. A discourse cannot become dominant in language alone. Besides that the discourse should be commonly accepted by the population, the discourse should also be used in institutions, like governments, policy documents and laws. Step 3 will describe the image that is created in the policy field of flood management of the flood management discourse. It reveals if a shift has taken place in flood management.

For both, step 2 and step 3, I will look at different elements in flood management which reveal the development of the flood management discourse. These elements are the perceptions on climate

change, as the effects of climate change are important in flood management, the different measures taken in flood management, with a closer look at the water safety norms and third the public-private divide, the involvement of public and private actors. In the end, the development of the flood management discourse over time should become clear, as well as the shift that has taken place in flood management and the impact of events on flood management.

The end result, step 4, will provide a comparison between New York and Rotterdam in the different traditions on flood management and in the development of the flood management discourse. Comparing New York and Rotterdam will give the answer on the research question.

Chapter 3: Methodology

The methods that are used in a research are an important tool in collecting data. Methods are *“the actual micro-level techniques used to collect and analyse data. Methods of data collection include interviewing, surveying, observation, and unobtrusive methods, while methods of analyses comprise quantitative strategies and qualitative strategies”* (O’Leary 2010, p. 89). In chapter 1, it already became clear that this thesis will have a case study approach and a discursive approach. Now, the methods will be described which can be linked to both approaches. Furthermore, the methods that have been used can be linked to the four steps described in chapter 2. The steps are:

Step	
1	The tradition on flood management
2	Discourse structuration
3	Discourse institutionalization
4	Comparing New York and Rotterdam

In short, the first step is defining the flood management tradition of New York and Rotterdam. Therefore, a secondary literature research will be done. In step 2 and 3 a discourse analysis is conducted, whereby a newspaper analysis is done in step 2 and a policy field analysis is done in step 3. Step 2 and step 3 take a look at three elements, the perceptions on climate change, the measures taken in flood management and the public-private divide, to define the development of the flood management discourse. Step 4 will compare both case studies.

3.1 Case study approach

This thesis will have a case study approach. In chapter 1, it was already argued that a case study refers to a method of studying elements by describing and analyzing a single situation or case (O’Leary, 2010). A case study approach focusses on describing and analyzing cases, which are relevant for your research. Relevant cases or chosen based on a case selection.

“The first is to define your case, or to set the boundaries that will give meaning and characterization to the class of ‘elements’ you wish to explore. The second involves selecting an individual case or series of cases that meet your definition and sit within your case boundaries.” (O’Leary 2010, p. 175)

The cases used in this thesis are urban coastal cities. The first case is New York. New York was hit by hurricane Sandy at the end of 2012, which caused a lot of damage as there are no flood defenses to

protect the city from flooding. The other case is Rotterdam. *“Though the Dutch and American histories of coastal engineering stand out from the other histories by the central role that natural disasters played in shaping the coastal engineering, the way they did so is strikingly different.”* (Bijker 2007, p. 147) In both cities, major interests are at stake, looking at the economy New York has Wall Street and Rotterdam has an important harbor. Furthermore, both cities are urban coastal cities. But there are also differences, looking at the sense of urgency, the geography and the flood management tradition. New York deals with hurricanes, especially in the last decade with hurricane Irene (2011) and hurricane Sandy (2012), while in the Netherlands there was a big flood disaster in 1953 and in 1993 and 1995 the river flooded. Another difference is a difference in geography. New York is lying above sea-level, while Rotterdam lies below sea-level. Besides that, the United States is a much bigger country than the Netherlands. Furthermore, there is a difference in the flood management tradition, whereby New York seems to focus on vulnerability reduction and Rotterdam seems to focus on hazard reduction. With the case studies New York and Rotterdam, a western view is given on flood management.

The shift in flood management, described in the literature, can have different outcomes because of cultural differences, countries are path-dependent and therefore traditions are well established. This will result in various flood management discourses. The two case studies, New York and Rotterdam, will likely reveal a different perspective on the development of the flood management discourse. That countries are path-dependent, creating various flood management discourses, makes it appropriate to have a case study approach. The two cases can be compared to each other.

An introduction on the cases is given in chapter 4, about New York and in chapter 5, about Rotterdam. Furthermore, a secondary literature research will reveal the flood management traditions for both cities. A secondary literature research refers to a research in journal articles and books. It refers to data that already has been collected by others (O’Leary, 2010). Thereby, step 1 has been conducted.

3.2 Data collection and discourse analysis

With this thesis, I will focus on two various flood management discourses, New York and Rotterdam. Therefore, a discourse analysis will be done. Discourse analysis is a way to describe the meaning of written or spoken text. *“The basic assumption of discourse analysis is that language profoundly shapes one’s view of the world and reality, instead of being only a neutral medium mirroring it.”* (Hajer and Versteeg 2005, p. 176) O’Leary (2010) adds to this definition of discourse analysis that it interprets *“language as it is situated in a socio-historic context”* (p. 270). Some aspects have to be

taken into account when looking at discourse. First of all, Kaplan and Grabe (2002) argue that discourse can be distinguished into written and spoken text. Written text is about monologue. There is no interaction between people. Written text will be read by one person without the influence of others. Spoken text can be linked to dialogue. It is about the interaction between people, which can lead to several outcomes. In the interaction between people, reality is socially constructed and can be influenced by others. Depending on people who someone is interacting with, different realities can be created (Kaplan and Grabe, 2002). This thesis will focus on written text, as language and the implementation of new concepts and terms in text is an important part of the thesis. Another aspect which has to do with written text and has to be taken into account is the inclusion and exclusion of text. Text can be included and excluded in newspaper articles or in documents in the policy field of flood management. This will influence what people get to read, the story is framed (An and Gower, 2009; Dilevko, 1998).

Discourse can be divided into discourse structuration and discourse institutionalization, which is made clear in chapter 2. Discourse structuration will be examined in step 2 with a newspaper analysis. Discourse institutionalization will be examined in step 3 with a policy field analysis.

3.2.1 Newspaper analysis

The second step, which can be derived from the conceptual framework refers to discourse structuration. By analyzing newspaper articles, the development of the flood management discourse in language will become clear.

In chapter 2, it is argued that newspaper analysis or framing deals with the way a story is presented and that articles can be presented in many different ways (Dilevko, 1998). The shift in flood management consists of many new concepts and terms used which can be presented in newspaper articles. Furthermore, *“Millions of citizens turn to the news media daily and the media is a cornerstone institution in our democracies. One influential way that the media may shape public opinion is by framing events and issues in particular ways.”* (Vreese et al. 2005, p. 51)

Vreese et al. (2005) argues that there are two different approaches in analyzing newspapers. One approach is the issue-specific approach which *“allows for a profound level of specificity and details relevant to the event or issue under investigation”* (p. 55). This is also a disadvantage as *“the high degree issue-sensitivity make analyses drawing on issue-specific frames difficult to generalize, compare, and use as empirical evidence for theory building”* (p. 55). Therefore, I will use a generic approach *“which can be identified in relation to different topics, some even over time and in different*

cultural contexts” (p. 54). It is about what you find along the way. It is about how flood management develops over time. Therefore, I make use of different keywords which can be linked to the shift in flood management, as well as climate change. The same keywords have been used in both cases to make a good comparison. The following keywords have been used to search for newspaper articles in the Netherlands (in Dutch) as well as for the United States:

Keywords used for newspaper articles in the Netherlands and the United States
--

Climate extremes, extreme weather, rising sea-level, water safety norms, levees, dams, storm surge barriers, evacuation, floodplain, flood-prone, warning, spatial planning - buildings, infrastructure and water storage, living with water, fighting against water, public actors, private actors, national, regional and local government, federal and state government, insurance companies, government, governance, resistance, resilience, Netherlands, United States, American, Dutch, Rotterdam, New York

There was no time frame used in searching the articles. The search revealed that most of the articles are coming from the last decade, likely because flood management and climate change are relatively ‘new’ concepts. Articles have been found from 1982 until 2013 in the search of American newspapers. Thereby, it has to be said that only 8 articles are coming from 1982 until 1999. The Dutch newspapers have resulted in articles from 2000 until 2013. Using no time frame is part of ‘generic approach’ as well, as it is about finding what happens over time, instead of focussing on certain events which can make the search too specific and hard to compare with different cases (Vreese *et al.*, 2005). In all of the journal articles which I found, newspaper analysis was done on the newspapers with the “*highest daily circulations*” (Houston *et al.* 2012, p. 610) or are “*large national circulation newspapers*” (An and Gower 2009, p. 109). Boykoff and Boykoff (2007) argue that national newspapers,

“beyond directly reaching their readers, they also influences news coverage of other, second tier, or smaller newspapers across the country, because: (a) reporters, editors and publishers frequently consult these newspapers for decisional cues on what is ‘news’, and (b) stories from these newspapers are often printed verbatim in regional, state and local newspapers” (p. 1194).

Therefore, I have chosen to use two of the biggest newspapers in both countries, as these newspapers have likely the most influence in a country and therefore also influence both coastal cities. The quote of Boykoff and Boykoff (2007) reveals that national newspapers make use of the information of smaller newspapers across the country. Furthermore, using regional newspapers makes the search too specific and not everything will be covered, like the perceptions on climate

change, the role of different actors or different measures which mostly focus on a national level instead of the regional or local level.

For the Netherlands, I have used the newspapers De Telegraaf and Algemeen Dagblad. Newspapers used for the United States are USA Today and New York Times. The newspaper articles were collected via an electronic database search called Lexis-Nexis, using the key words mentioned above. In total 107 relevant articles were found in the search of the two Dutch newspapers. The search in the American newspapers have resulted in 76 relevant articles. In the appendix all the newspaper articles are mentioned.

Analyzing the results

The newspaper articles have been analyzed with the program Atlas.ti. Atlas.ti is a program for analysing qualitative data. O'Leary (2010) describes 5 steps for analyzing qualitative data: (1) organize their raw data, (2) enter and code that data, (3) search for meaning through thematic analysis, (4) interpret meaning and (5) draw conclusions (p. 257). Step 1, 2 and 3 can be linked to Atlas.ti.

First, all the newspaper articles, raw data, is implemented in the program. Second, codes are created. The codes that I have used in Atlas.ti are climate change, protection against floods (hazard reduction, vulnerability reduction and exposure reduction), public-private divide, water safety norms, resistance-resilience, American/United States and Dutch/Netherlands. The codes used are visible in figure 3.1. The codes that I have used can be linked to chapter 4 and chapter 5 in this thesis. In these chapters I take a look at several elements to describe the development on flood management. I make a distinction between the perception on climate change, the measures taken in flood management, and the public-private divide, all the codes can be linked to these elements as well. When the codes are made, concepts, terms and quotes can linked to the different codes, they can be coded. Figure 3.2 reveals how the concepts, terms and quotes are coded. The documents are presented in the middle. On the right side, the different codes are visible when being linked to a certain quote, concept or term. By highlighting a quote, concept or term, the code can be attached. The end result gives a list of all the quotes, concepts and terms that are coded, for each different code.

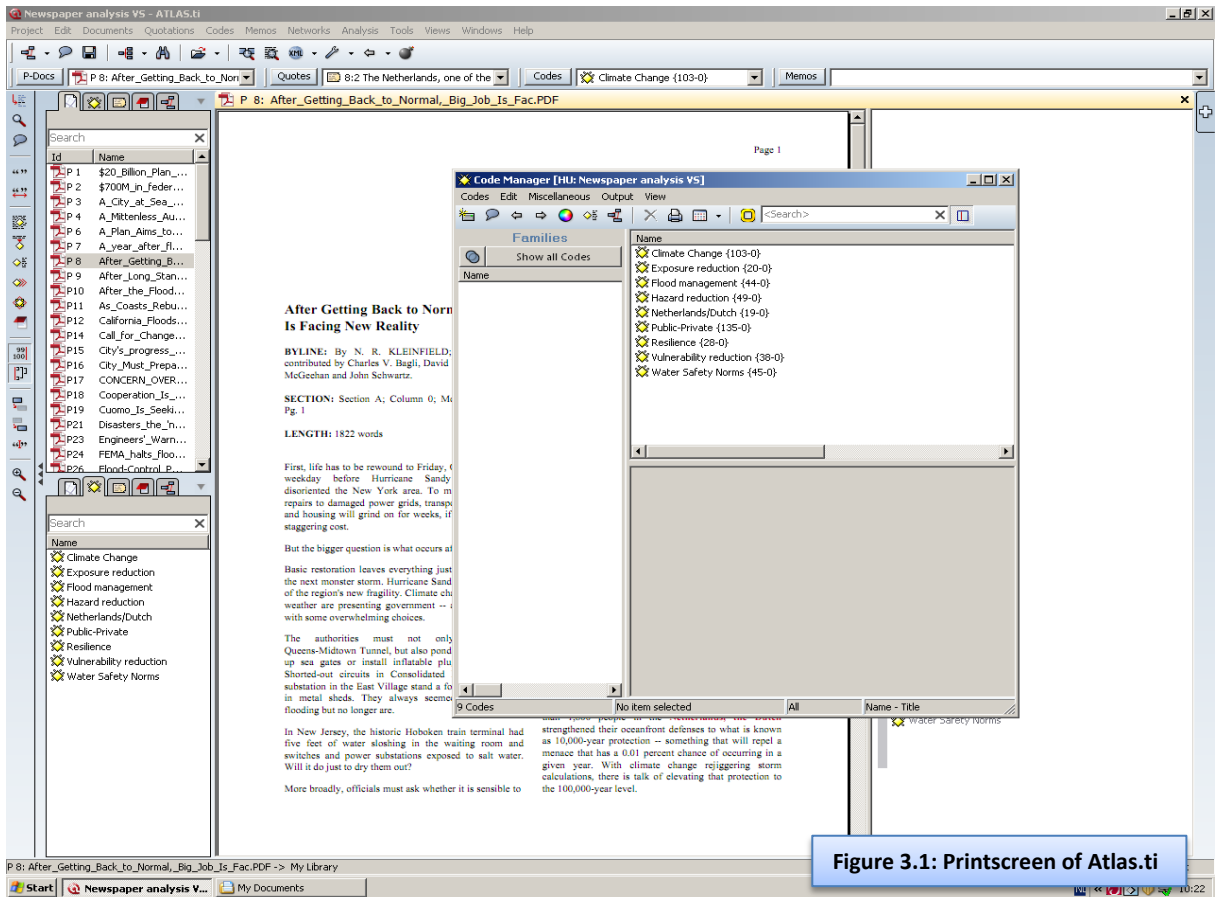


Figure 3.1: Printscren of Atlas.ti

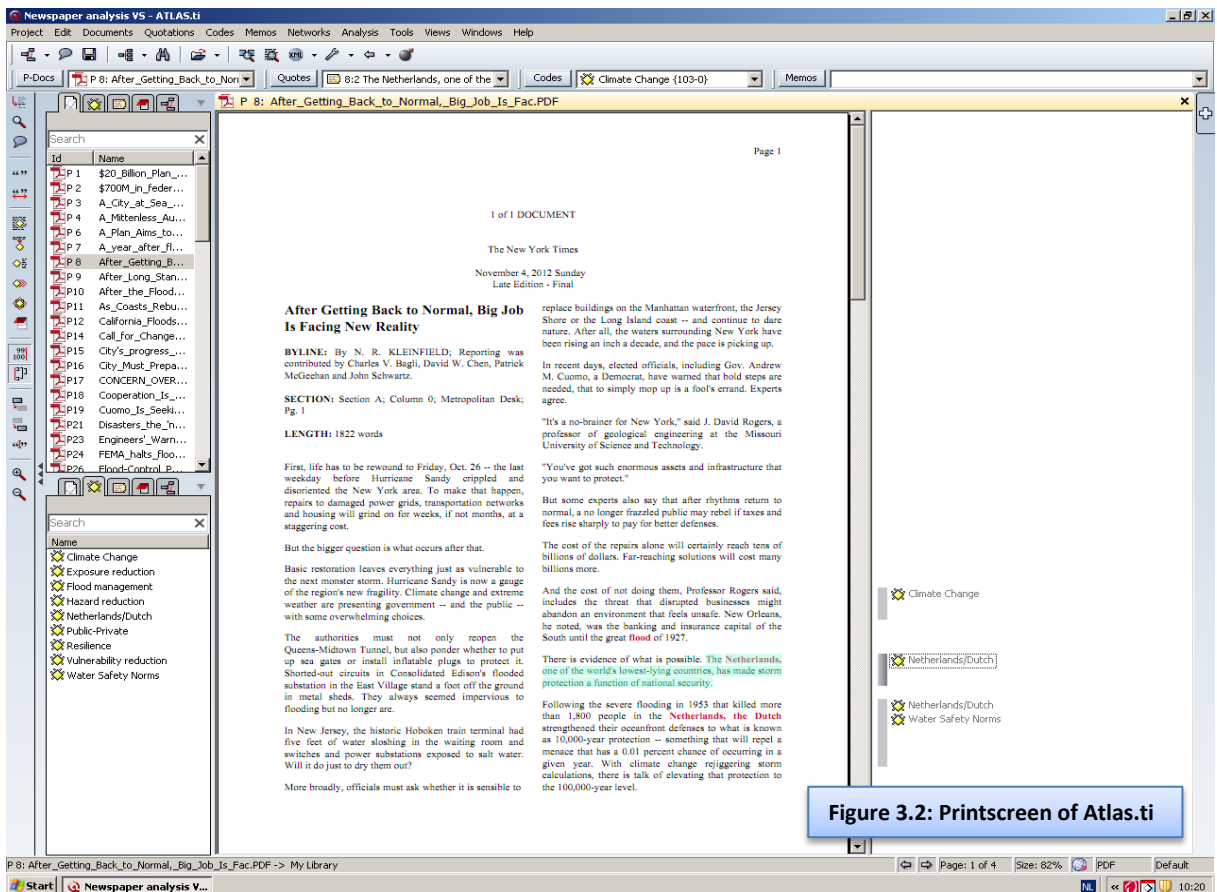


Figure 3.2: Printscren of Atlas.ti

After analyzing the newspaper articles, the meaning of language will be interpreted. How has the flood management discourse in newspaper articles developed over time, looking at the perceptions on climate change, the measures taken in flood management and the public-private divide, the involvement of actors. Is the shift in flood management visible in newspaper articles? The newspaper analysis will conduct step 2 of the conceptual framework.

3.2.2 *Policy field analysis*

The third step, which can be derived from the conceptual framework refers to discourse institutionalization. By analyzing the policy field of flood management, it will become clear if language of newspaper articles has solidified into institutions. The institutions can refer to governments, policy documents, laws and organizations. The policy field analysis will give an overview of the institutional context, describing the actors involved in flood management. The size of country, for example, has an effect on the involved actors as the Netherlands can approximately fit in the United States 230 times. In the Netherlands, the national government plays an important role in flood management, while national government of the United States does not play an important role.

Besides an overview of the institutional context, relevant policy documents will be analyzed. A relevant policy document for the New York is PlaNYC 2030, which is a plan made on the local level by the City of New York. The policy field of flood management in the United States is very fragmented, other policy documents and plans only focus on one element, like the Federal Emergency Management Agency (FEMA), who focusses on disaster management. Therefore, I will only take a look into PlaNYC 2030, as this plan consists of all the elements important for flood management in the New York. The role of the FEMA, for example, is mentioned as well in this local policy document. PlaNYC 2030 consists of all kind of subjects, from transportation to public health, from food to air quality. Therefore, I will only take a look at the part about climate change. For Rotterdam, more policy documents are relevant for analyzing the policy field as the policy on flood management is implemented differently than in New York. The policy documents relevant for analyzing are Deltaprogramma 2013, Provinciaal Waterplan Zuid-Holland 2010-2015 and Waterplan 2 2007-2012. These are the policies made on the national, regional and local scale. Waterplan 2 2007-2012 has not been updated yet and therefore the latest version is analyzed.

The following table shows all the policy documents which have been analyzed:

	What?	Who?
New York	PlaNYC 2030 (updated 2011) - Climate Change	The City of New York
Rotterdam	Deltaprogramma 2013	Rijkswaterstaat (national government)
	Provinciaal Waterplan Zuid-Holland 2010-2015	Province of Zuid-Holland
	Waterplan 2 2007-2012	Municipality of Rotterdam and the water boards of Hollandse Delta, Schieland and the Krimpenerwaard, Delfland

The policy field analysis will in the end reveal what the institutional context is on flood management, which actors are involved, who is responsible. Furthermore, the policy documents reveal to what extent new concepts and terms mentioned in newspaper articles as well as in the literature are visible in the policy field of flood management and what are the main goals, which measures are taken. In other words, is discourse institutionalization visible. Has the flood management discourse become dominant.

3.2.3 *The end result*

The results from the secondary literature research on the flood management tradition, the newspaper analysis and the policy field analysis will end in a comparison between the New York and Rotterdam, step 4 in the conceptual framework. How have both flood management discourses been developed over time, are the cities influenced by culture and do events have an impact on the flood management discourse. What the flood management tradition is in a country, how the flood management discourse has developed, also looking at the shift that has taken place in flood management, and what the dominant flood management discourse is for a country can help countries in the future. To see how other countries are working with flood management and how different concepts and terms have played out can help to rethink flood management for New York and Rotterdam. Urban coastal areas can draw lessons from the development of the flood management discourse.

Chapter 4: New York, vulnerability reduction

New York is one of the two urban coastal cities analyzed in this thesis. First, an introduction will be given about the case study, New York. What follows is the flood management tradition in New York. It reveals the cultural influence on flood management and shows which decisions are made and why these decisions are made in flood management. The newspaper analysis and the policy field analysis are divided into a few elements which reveals the development of flood management discourse by taking a look at, the perceptions on climate change, the measures taken in flood management and the public-private divide.

4.1 Introduction on New York

New York, a city surrounded with water, a city recently hit by hurricane Sandy (ANP, 2012b) and earlier hurricane Irene (Elshout, 2011), a city threatened by floods. New York is a city that deals with water coming from the Atlantic Ocean and water coming from several rivers, the Hudson River, the East River and the Harlem River, which can be seen on figure 4.1. The location is part of why New York has to deal with floods and climate extremes. Hurricanes have caused a lot of damage in the last

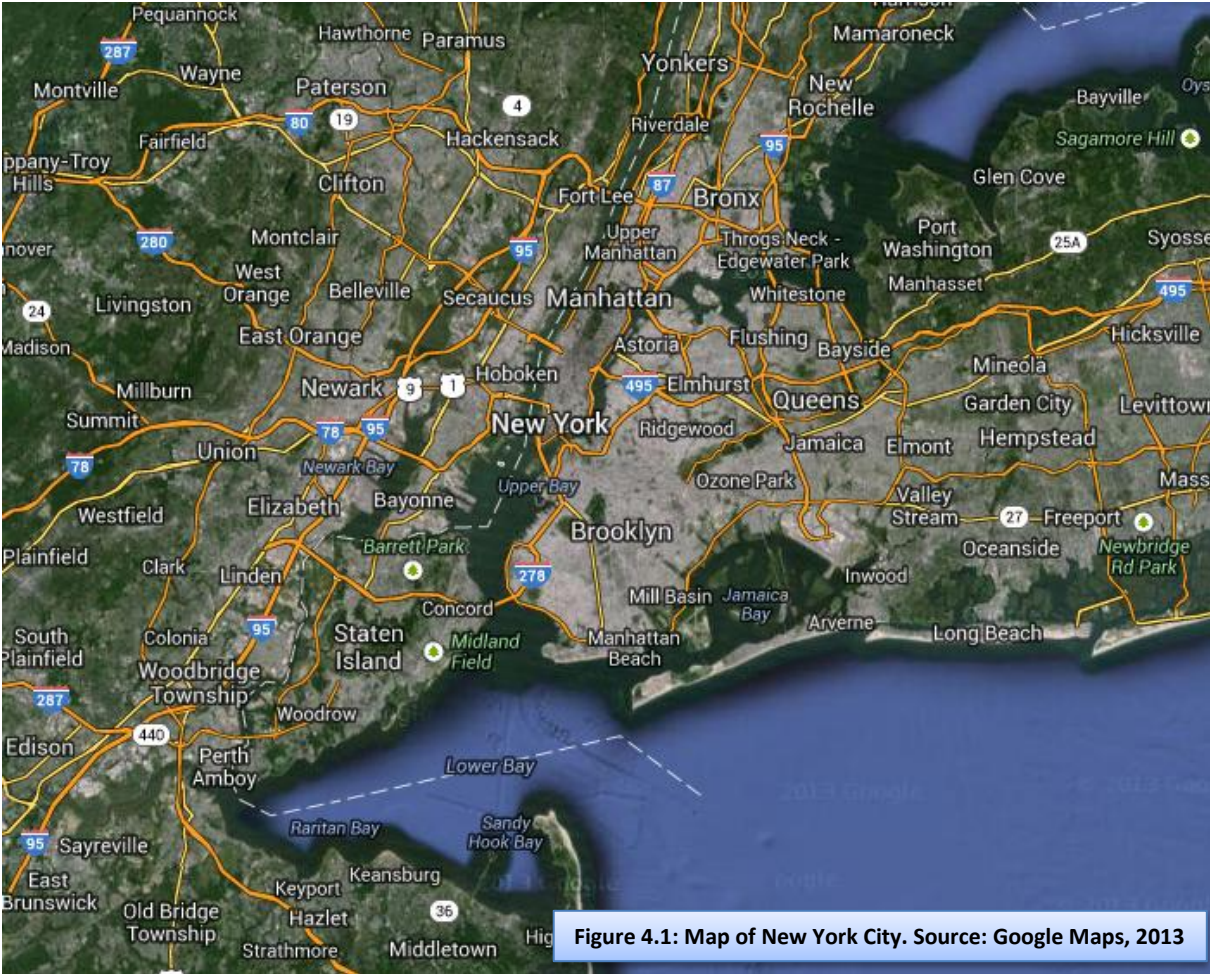


Figure 4.1: Map of New York City. Source: Google Maps, 2013

decade. New York is in a vulnerable position. Furthermore, the city is highly populated and it is an important economic city. Major interests are at stake. It is important for New York to protect the city against floods and face the risks. The way to deal with floods is flood management. Literature has revealed that culture influences flood management as a country is path-dependent and therefore traditions are well established. What the flood management tradition is in New York will be revealed in the next session, which can be linked to step 1 in the conceptual framework.

4.2 The flood management tradition: vulnerability reduction

The best thing that could possibly come out of Sandy is if the political establishment was willing to say, 'Let's have a conversation about how we do this differently the next time,' [...]. We need to identify those areas -- in advance -- that it no longer makes sense to rebuild."
(The New York Times, 2012a)

People already started rebuilding their houses in floodplains, just a month after the hurricane hit New York (The New York Times, 2012a). This has not happened once, it happens all the time in the United States when a flood has occurred. Looking back in the past, New Orleans can be given as a good example. After hurricane Katrina in 2005, houses were rebuilt in flood risk areas. The government does not give any guidance in building codes and floodplains are not prohibited for housing. Even after 8 years, a lot of houses are gone and a lot of houses are still destroyed, other people rebuild their houses (ANP, 2012c). This is striking. There is not enough money coming from the Federal Emergency Management Agency for rebuilding houses or building houses with building codes. Insurance companies are not willing to insure against floods. The government does not prohibit floodplains. People have to take their own responsibility (Loucks *et al.*, 2008).

There is a struggle visible between flood management as a private good or as a public good. *"Just how much do we want the public agencies to spend to protect those who subject themselves to both the benefits and risks of occupying floodplains?"* (Loucks *et al.* 2008, p. 545) People who are going to live in areas with chances on floods weigh their costs and benefits. When benefits are exceeding the costs, people are going to live in floodplains. For the government, it is hard to do something about this, except prohibiting those areas or provide building codes. Otherwise, money could as well be used for more important things, like schools or health care (Loucks *et al.*, 2008). Reasons why this debate will be going until something is done are recent events like hurricane Irene and hurricane Sandy. Flood management is becoming more important, as climate extremes will increase as well as the sea-level (Smith *et al.*, 2011).

The flood management discourse has an influence on the struggle in the public-private divide. *“The American practice focuses on predicting disasters and mediating the effects once they have happened, in brief: on ‘flood hazard mitigation’.”* (Bijker 2007, p. 147) The focus in the United States is on vulnerability reduction, preparing urban areas for floods, clean up after a flood has occurred, disaster management. The country deals with floods and flood risks, by making evacuation plans, early warning systems, making infrastructure and buildings capable of dealing with floods by providing building codes to reduce the chance of damage when a flood occurs (Meijerink and Dicke, 2008; Oosterberg *et al.*, 2005).

The focus on vulnerability reduction can be found in the past. In the past, the United States focused on scientific research. *“It is important to collect information on natural disasters shortly after their occurrence, to document events and effects”* (Wiegel and Saville, 1996 in Bijker 2007, p. 146). Furthermore Wiegel and Saville (1996) state that *“they recognize the boost that disaster can give to public awareness and coastal engineering and research, which often is the case after a natural disaster occurs which affects adversely lives and property of many people”* (in Bijker 2007, p. 146). It is recognized that a disaster can help to think about dealing with floods and doing research, but the opposite happens.

“Once the disasters have passed into history, little effort is made to evaluate the functioning of coastal projects: ‘Owing to the costs of monitoring and the seemingly [sic!] lack of interest of politicians to have follow up studies made of government funded projects, little monitoring is done.’ (Wiegel and Saville, 1996 in Bijker 2007, p. 146)

There never has been a lot of interest in flood management by the politics, although there have been enough hurricanes to use as a window of opportunity. *“A long string of hurricanes in the 1950s in the USA gave rise to a major effort by both the USACE (US Army Corps of Engineers) and the Weather Bureau to develop warning systems and protective measures.”* (Bijker 2007, p. 147) It has only resulted in the development of models to predict hurricanes, used for protection, warning and insurance. It seems like floods have been accepted in the United States, also referring to the water safety norms.

The focus on vulnerability reduction causes a lack of awareness for flood defenses. Water safety norms are not up to date. The government stands for a 99 years with dry feet, but they cannot guarantee this anymore (Loucks *et al.*, 2008) as can be seen in figure 4.2. The governor of New York, Andrew M. Cuomo, agrees and exaggerates: *“They call it the hundred-year flood, because it’s only supposed to happen every hundred years, [...]. I told President Obama, we have a hundred-year flood*

every two years.” (The New York Times, 2012b) Figure 4.2 shows that climate change projections for New York City for 2000 were a flood once every 100 years. The risks on floods are increasing because of a rising sea-level and the increase of climate extremes. By the time of 2020 a flood occurs once every 65 to 85 years (The City of New York, 2013).

Climate Change Projections for New York City¹

	BASELINE 1971-2000	2020s	2050s	2080s
Air Temperature²	55°F	+ 1.5 to 3°F	+ 3 to 5°F	+ 4 to 7.5°F
Precipitation²	46.5 in	+ 0 to 5%	+ 0 to 10%	+ 5 to 10%
Sea Level Rise^{2,3}	NA	+ 2 to 5 in	+ 7 to 12 in	+ 12 to 23 in
Rapid Ice-Melt Sea Level Rise⁴	NA	+ 5 to 10 in	+ 19 to 29 in	+ 41 to 55 in
Number of Days Per Year With Temperature Over 90°F	14	23 to 29	29 to 45	37 to 64
1-in-100 Year Flood to Reoccur, On Average⁵	once every 100 years	once every 65 to 85 years	once every 35 to 55 years	once every 15 to 35 years

1 Based on 16 Global Climate Models (GCMs) (7 GCMs for Sea Level Rise) and three emissions scenarios. Baseline is 1971-2000 for temperature and precipitation and 2000-2004 for sea level rise. Data from National Weather Service (NWS) and National Oceanic and Atmospheric Administration (NOAA). Temperature data are from Central Park; precipitation data are the mean of the Central Park and La Guardia Airport values; and sea level data is from the Battery at the southern tip of Manhattan (the only location in NYC for which comprehensive historic sea level rise data are available).
 2 Projections represent the middle 67% of values from model-based probabilities; temperatures ranges are rounded to the nearest half-degree, precipitation to the nearest 5%, and sea level rise to the nearest inch.
 3 The model-based sea level rise projections may represent the range of possible outcomes less completely than the temperature and precipitation projections.
 4 Rapid ice-melt scenario is based on acceleration of recent rates of ice melt in the Greenland and West Antarctic ice sheets and paleoclimate studies.
 5 Does not include the rapid ice-melt scenario.

**Figure 4.2: Climate Change Projections for New York City.
Source: The City of New York, 2013**

To conclude, the flood management tradition of New York has always been focused on vulnerability reduction. This is due to history and geography:

“The US by contrast has an incredible diversity of hazards each of which is equally threatening in its own way; in fact, the USA may be one of the most hazard prone nations in the world. In a large part due to its size, climatology, and geography the nation faces an incredible number of different threats including floods, tornadoes, earthquakes, hurricanes, and many others. [...] This diversity of exposure to risks has led to a similar level of variation in from state to state, region to region, and even from city to city in how such threats are managed. With so many different hazards each competing for national attention it is difficult for one to emerge as ‘the’ central or focal issue of concern.” (Netherlands US Water Crisis Research Network 2012, p. 20)

The United States is a country which deals with many different natural disasters. That is also why the focus in the United States is on disaster management and emergency management as that is something that can be organized on a much higher level than the local level, like the state or federal

level (Netherlands US Water Crisis Research Network, 2012). This causes flood management to be fragmented. It is not clear who is responsible for what, as disaster management is aimed at all natural disasters instead of only floods for example. People keep on living in floodplains. The Federal Emergency Management Agency does not have enough money for the damage done by floods. Insurance companies insure damages, but not caused by floods. This is not only due to the size of the country, but also the focus on the individual. People take their own responsibilities as they have always done. Meijerink and Dicke (2008) argue that, *“without belief in the common good as something that the government should define and protect; there is an inclination to privatize and individualize public functions, rather than to defend their value”* (p. 506).

4.3 Discourse structuration, from vulnerability reduction to hazard reduction

The flood management tradition has an influence on how the flood management discourse develops over time. Events like hurricane Sandy can be used as a window of opportunity, a chance to rethink flood management and think about the implementation of new concepts in flood management which could help protect the city. The language used in flood management can be revealed by newspaper articles, step 2. In total 76 articles have been analyzed of two of the biggest newspapers, the USA Today and the New York Times. Articles were found from 1982 until 2013, whereby 8 articles are coming from the previous century. This already reveals that flood management is something that is introduced in the last decade and it is getting more important.

This section is divided into three elements. The first element is the perceptions on climate change as the effects of climate change in combination with urbanization likely cause more floods. The second element is the measures taken in flood management. The flood management tradition of New York revealed that the city is focusing on vulnerability reduction (Bijker, 2007; Meijerink and Dicke, 2008). The third element is the shift in the public-private divide, which tells something about the involved actors. The literature revealed that flood management has shifted from task of the state towards the involvement of new public and private actors (Meijerink and Dicke, 2008), but in the United States flood management has never really been a pure collective good (Loucks *et al.*, 2008; Netherlands US Water Crisis Research Network, 2012). In the end, all the elements will be brought together and show how the flood management discourse is visible in newspaper articles, which new concepts and terms have become popular, what kind of measures are mentioned more over time, how important are water safety norms, what is the role of insurance companies.

4.3.1 Perceptions on climate change

Climate change is designated as cause of a rising sea-level and the increase of climate extremes. In the newspaper articles it is visible that the concepts of climate change and global warming are introduced in the late '90s. In 1998 an article reports after a year with "weird weather",

"Mischief from El Nino? In part. But extreme weather is also consistent with global-warming scenarios. The scientists of the Intergovernmental Panel on Climate Change, a United Nations group, expect a two-to-six-degree increase in global temperature by 2100, with a result that sea levels could rise as much as two feet." (Severe weather warning. The New York Times. August 2, 1998)

An article from 1999 also reveals that global warming is something that needs to be taken into account. *"New York City will be hit hard by the effect of global warming over the next century, as the sea level rises and washes away beaches, floods the subways and creates new wetland areas in Brooklyn, Queens and Staten Island, an environmental group said yesterday."* (Report warns New York for perils of global warming. The New York Times. June 30, 1999) Thinking of October 2012, hurricane Sandy, the effects are visible looking at this article of 1999, as subways were flooded in New York, the power was down and houses at the beach were destroyed.

The beginning of this century acknowledges the effects of climate change as well as something that needs to be taken into account, *"[...] recent predictions by NASA scientists at the Goddard Institute for Space Studies in New York City say that with climate change and global warming, sea level will rise as much as an additional one and a half feet by 2050."* (A City at Sea. The New York Times. September 25, 2005) But the media has been skeptical towards climate change at the beginning of the decade in 2001. *"The new evidence of human-caused warming comes as the Bush administration is turning its attention back to climate change, which it had approached with skepticism and a determination to choose no remedies [...]."* (A mittenless autumn, for better and wors. The New York Times. December 23, 2001) The Kyoto protocol was turned down. People were not aware of the effects of climate change and thought it was all a joke.

"President Clinton could count on the fingers of one hand the Senators who were willing to support the 1997 Kyoto agreement on climate change. Americans were snapping up SUV's at a rapid clip, and propaganda underwritten by Exxon, Big Coal and some of the major power companies had people wondering whether the whole thing wasn't some sort of gigantic hoax." (Global warming, local damage. The New York Times. July 15, 2007)

One thing in which every newspaper article agrees is the influence of humans on the climate, which causes the climate to change. From 2000, *“I think it’s increasingly clear that humans are influencing the climate, said Dr. Peter H. Gleick [...]”* (A mittenless autumn, for better and worse. The New York Times. December 23, 2001), towards a newspaper article in 2007, *“[...] the human contribution to climate change is now beyond and serious dispute, the naysayers have been largely marginalized, business interests are tripping all over themselves to be greener than the next guy”* (Global warming , local damage. The New York Times. July 15, 2007)

That the view has changed on climate change is clear. Along the way, climate change is seen as something that has to be taken into account instead of being skeptical about it. *“I don’t call it ‘global warming’ because you trigger a whole political debate, Mr. Cuomo said. But the frequency of extreme weather is going way up.”* (Reckoning with realities never envisioned by City’s founders. The New York Times. October 31, 2012) One way or another, a country needs to deal with climate change. That New York City wants to adapt to climate change is clear with PlaNYC 2030 that has been revealed. But it is also difficult to do so, *“[...] as city officials earn high marks for environmental awareness, critics say New York is moving too slowly to address the potential for flooding that could paralyze transportation, cripple the low-lying financial district and temporarily drive hundreds of thousands of people from their homes.”* (New York is lagging as seas and risks rise, critics warn. The New York times. September 11, 2012) This newspaper article was released two months before hurricane Sandy.

That New York needs to change is now more than ever visible and this is beyond the debate whether it is climate change or not, according to the mayor of New York City, Michael Bloomberg. *“[...] the storms that we’ve experienced in the last year or so around this country and around the world are much more severe than before, [...]. Whether that’s global warming or what, I don’t know. But we’ll have to address those issues.”* (Worrying beyond hurricane Sandy. The New York Times. November 1, 2012) The mayor of New York City outlined a far-reaching plan to protect New York against climate change. *“[...] the mayor had commissioned a panel to study the changing climate, rising oceans and more powerful storms, and to propose plans to address the risks.”* Climate change is seen as one of the factors which have to be taken into account by New York, according to Mayor Bloomberg. But there are different views on PlaNYC 2030.

“I think that the mayor’s plan is great, said Robert S. Young, director of the Program for the Study of Developed Shorelines at Western Carolina University. I really appreciate the fact that he acknowledges the problem and understands climate change and the fact that we need to

prepare for it. But everyone needs to understand that you can't guarantee protection for infrastructure that is in vulnerable locations, no matter how much money you throw at the problem." ([\\$20 Billion plan to shore up city as climate shifts. The New York Times. June 12 2013.](#))

The debate on climate change will continue, but that it has to be taken into account is clear. New York is at a vulnerable location, which cannot be changed. Therefore, New York needs to find ways to deal with the effects of climate change and urbanization.

4.3.2 *Continue vulnerability reduction or changing towards hazard reduction*

The flood management tradition has revealed that New York focusses on vulnerability reduction, by making evacuation plans, early warning systems and making buildings and infrastructure capable of dealing with floods. The focus on vulnerability reduction is visible in the literature as well as in the newspaper articles. *"[...] the city, [...], had developed a coastal storm plan that treated seriously the city's susceptibility, given its 520-mile coastline. [...] most of that focuses on mapping a response to the disaster after it already occurs."* ([For years, warning that it could happen here. The New York Times. October 31, 2012](#)) Buildings codes are made up to date, *"In 2008, council members revised the building code to recognize the city as being within a hurricane-prone region. Under the updated code, all new building design and construction is required to be hurricane-resistant."* ([High and dry. The New York Times. October 2, 2011](#)) Even after hurricane Sandy, New York seems to keep on focusing on vulnerability reduction.

"New York City, still reeling from the impact of Hurricane Sandy, will expand its evacuation zones, tighten building codes and look for ways to fortify critical infrastructure like transportation and electrical networks from future natural disasters, Mayor Michael R. Bloomberg said Thursday." ([Mayor pledges to rebuild and fortify coast. The New York Times. December 7, 2012](#))

A researcher from the Netherlands did find the same focus in American practices: *"Jeroen Aerts, [...] who was hired by New York in 2009 to assess flood risks and protections, said officials initially preferred to focus on cheaper and less-intrusive options like flood-proofing buildings and expanding wetlands to absorb more water."* Furthermore he said that, *"The assumption, [...], was that unlike New Orleans, New York City is far enough above sea level and skilled enough at evacuations that it could prevent a major loss of lives."* ([Weighing sea barriers as protection for New York City. The New York Times. November 8, 2012](#))

Hurricane Sandy has proven the opposite, there seems to be a change in the flood management discourse. The last decade, a debate started about the implementation of dams, dykes and storm surge barriers in New York, likely influenced by hurricane Irene and hurricane Sandy. Just one month before hurricane Sandy, a discussion is started on flood protection. *“Some New Yorkers argue that the answer lies not in evacuation, but in prevention, like armoring city waterways with the latest high-tech barriers. Others are not so sure.”* (New York is lagging as seas and risks rise, critics warn. The New York Times. September 11, 2012) New York needs to rethink after hurricane Sandy. *“Despite the pervasive liberalism of New Yorkers, particularly on the issue of climate change, Tropical Storm Irene last year did not spur a radical shift in thinking among developers. The devastation of this year’s storm will force a reconsideration of certain practices, [...]”* (The real luxury: a way out. The New York Times. November 4, 2012)

It seems that the flood management discourse in New York is shifting from vulnerability reduction towards hazard reduction. *“Mayor Michael R. Bloomberg outlined a far-reaching plan on Tuesday to protect New York City from the threat of rising sea levels and powerful storms surges by building an extensive network of flood walls, levees and bulkheads [...]”* (\$20 Billion plan to shore up city as climate shifts. The New York Times. June 12 2013) The same discourse shift was visible in New Orleans after hurricane Katrina, although the focus should not be dependent on hazard reduction alone. *“Experts said the key element was a wide variety of solutions and redundancies. Hurricane Katrina, for example, showed that a reliance on ‘hard’ solutions alone, like levees, can fail.”* (Hoboken Mayor seeks storm protection more suitable for high-rise buildings. The New York Times. February 13, 2013) By implementing elements of hazard reduction, New York can take an example of the Netherlands. *“[...] the Dutch are the masters of coastal engineering, dyke construction, reclamation of land and flood protection measures using surge barriers (half of the Netherlands, including Amsterdam and Rotterdam, lies below sea level).”* (A city at sea. The New York Times. September 25, 2005) It is said that this is also a difference in attitude.

“Mr. Glas said he was dismayed by images on television of darkened, waterlogged buildings in Lower Manhattan, and wondered how the area would have fared if it had a Dutch approach to the problem. American society, he said, is more dependent on self-protection and taking care of your own household, attitudes that make it difficult to mobilize public attention and money to prevent disasters ahead of time.” (Lessons for U.S. from a flood-prone land. The New York Times. November 15, 2012)

Like in New Orleans, the implementation of hard infrastructure is not always taken positively as is the Dutch approach. *“The Dutch response to New York’s events, he said, would be to build big barriers,*

but a better, cheaper answer may lie in local solutions like flood-proof entrances to subway stations and parking garages.” Every city and country has to deal with different circumstances. “You need to be careful not to just copy Dutch solutions, [...]” (Lessons for U.S. from a flood-prone land. The New York Times. November 15, 2012)

Besides looking at hazard reduction, New York has also taken a look at exposure reduction. After hurricane Sandy, an idea was proposed to relocate buildings and houses. But this is hard, as was revealed in the literature. People weigh the costs and benefits for living in a floodplain. *“A proposal to buy the damaged homes of New Yorkers who want to relocate after Hurricane Sandy is finding few takers, as most residents opt to rebuild, [...]” (Homeowners in flood zones opt to rebuild after hurricane, not relocate. The New York Times. April 27, 2013)* A shift towards exposure reduction is not likely. But prohibiting floodplains may be necessary as it will become hard to protect the population with a rising sea-level and more climate extremes. Linked to relocating and rebuilding houses and buildings are the water safety norms. The water safety norms are relevant for flood defenses, but most importantly for creating flood maps in New York.

Water safety norms

“Officials estimated that more than 800.000 city residents would live in the 100-year flood plain by the 2050s -- more than double the 398.000 currently at risk, based on new maps released by the Federal Emergency Management Agency.” (\$20 Billion plan to shore up city as climate shifts. The New York Times. June 12 2013) The impact of a flood will become enormous in New York. The damage done by climate extremes will become higher.

Flood maps are not up to date, which results in a lack of awareness among people. This is not from recent years, but it is already mentioned in 1999. *“The obvious concern, officials said, is that plans based on obsolete maps are inherently flawed. Indeed, Mr. Buckley said 58 percent of New Jersey’s flood maps are at least 15 years old.” (After the flood; with a billion dollars in damage, New Jersey will be wringing out a long time. The New York Times. October 17, 1999)* Still, after hurricane Sandy, water safety norms are not sufficient. *“[...], many of the flood maps the program relies on are out of date -- which can have expensive, and even deadly, consequences in this era of rising sea levels if homeowners are not cognizant of the risks they face.” (Flood insurance, already fragile, faces new stress. The New York Times. November 13, 2012)* Old data is used by the Federal Emergency Management Agency to create flood maps, which put people in a vulnerable position.

“New federal flood maps released on Monday revealed the grim news that many New Yorkers were girding for after Hurricane Sandy sloshed away: More areas farther inland are expected to flood. Tidal surges will be more ferocious. And 35.000 more homes and businesses will be located in flood zones, which will almost certainly nudge up insurance rates and determine how some structures are rebuilt.” (Twice as many structures in FEMA’s redrawn flood zone. The New York Times. January 29, 2013)

More updated maps should be made available, not only for the citizens but also for insurances.

Furthermore, floods can occur much more. Protection has to be better to prevent that floods occur more often. “[...], devastating floods that now are expected to occur once a century could hit the area every 40 years.” (Forecast for New York this century: Hotter and wetter. The New York Times. June 27, 2004) Over the years, this view comes back. “By the end of this century, [...], 100-year-floods could hit New York City every 10 years.” (Global warming, local damage. The New York Times. July 15, 2007) Also, governor Cuomo warns for more frequent floods. “They call it the hundred-year flood, because it’s only supposed to happen every hundred years, Mr Cuomo said. I told President Obama, we have a hundred-year flood every two years.” (Reckoning with realities never envisioned by City’s founders. The New York Times. October 31, 2012) Public and private actors have to take a look at water safety norms. Now, people or not well informed because flood maps are not up to date and it is possible that people who live just outside of the once every 100-year flood are just as vulnerable as people who live in those areas.

There are suggestions to change the view on water safety norms. “We have to rethink these flood heights to be more like, ‘Every year your chance of flooding is 1%’, rather than thinking it won’t happen for 100 years, says urban flooding expert Jeroen Aerts of the Vrije Universiteit (University) in Amsterdam.” (Sandy revives debate over rising sea level; scientists warn every inch plays a role in storms. USA Today. November 28, 2012) Another suggestion is protecting the city against a flood once every 500 year. “While New York building codes generally set standards to account for 100-year protection, Professor Rogers said he believed that the city should consider nothing less than 500-year protection.” (After getting back to normal, big job is facing new reality. The New York Times. November 4, 2012) This is more than necessary as hurricane Sandy flooded even the 500-year flood zones. “[...] two maps showed that the areas flooded by the hurricane had far exceeded FEMA’s projected 100-year and 500-year flood zones for the city.” (Mayor pledges to rebuild and fortify coast. The New York Times. December 7, 2012)

With the water safety norms, the Americans also take a look at the Netherlands. *“There is evidence of what is possible. The Netherlands, one of the world’s lowest-lying countries, has made storm protection a function of national security.”* The United States sees the Netherlands as an example. *“Following the severe flooding in 1953 that killed more than 1800 people in the Netherlands, The Dutch strengthened their oceanfront defenses to what is known as 10.000-year protection -- [...]. [...], there is talk of elevating that protection to the 100.000-year level.”* (After getting back to normal, big job is facing new reality. The New York Times. November 4, 2012)

The newspaper articles revealed that the focus in flood management is still on vulnerability reduction. As hurricanes pass by, renewed interest is visible on other ways of dealing with floods like hazard reduction and exposure reduction. It is striking to see that water safety norms are not up to date in the flood maps, while the United States is a country that focusses on evacuation plans.

Resilience

Linked to the shift of different measures taken in flood management is the shift towards resilience, which can be defined as a combination of hazard reduction, vulnerability reduction and exposure reduction. In newspaper articles, resilience is mostly defined as people who are fighting back after a hurricane hit their homes. *“Resilience, she says. Everything we worked for, the American dream, is gone. But we came back. Our friends and family helped.”* (A year after flood, Cedar Rapids fights back; recovery is slow, costly in Iowa city. USA Today. June 16, 2009) Use of the concept of resilience is visible in the case of New Orleans as well, *“Resilience is the word of the day, New Orleans mayor Mitch Landrieu said Thursday. We’re here. We’re unbowed. We’re unbroken. And we’ll continue to move ahead with our recovery, step by step.”* (City’s progress mixes with pain; New Orleans notes improvements five years since Katrina horrifically altered landscape, psyche. USA Today. August 27, 2010) And in more general for coastal cities, in 2008 as well, *“The key point is this: A natural disaster need not automatically result in human catastrophe. Simple, cost-effective measures will strengthen our resilience, save lives, and prevent the pauperization of millions tomorrow.”* (Disasters the ‘new normal’. USA Today. January 3, 2008) Resilience is seen as a solution for dealing with floods, not in a way by making more space for water, but making people, neighborhoods and buildings less vulnerable for floods. *“Among a growing number of scientists, social innovators, community leaders, nongovernmental organizations, philanthropies, governments and corporations, a new dialogue is emerging around a new idea, resilience: how to help vulnerable people, organizations and systems persist, perhaps even thrive, amid unforeseeable disruptions.”* (Learning to bounce back. The New York Times. November 3, 2012) Thereby, resilience is seen as the key for flood management for future New York after hurricane Sandy.

“It’s a broad-spectrum agenda that, at one end, seeks to imbue our communities, institutions and infrastructure with greater flexibility, intelligence and responsiveness to extreme events and, at the other, centers on bolstering people’s psychological and physiological capacity to deal with high-stress circumstances.”

Resilience does not propose a single, fixed future. *“It assumes we don’t know exactly how things will unfold, that we’ll be surprised, that we’ll make mistakes along the way. It’s also open to learning from the extraordinary and widespread resilience of the natural world, including its human inhabitants,[...]”* ([Learning to bounce back. The New York Times. November 3, 2012](#)) The New York Times further states:

“That doesn’t mean there aren’t genuine bad guys and bad ideas at work, or that there aren’t things we should do to mitigate our risks. But we also have to acknowledge that the holy war against boogeymen hasn’t worked and isn’t likely to anytime soon. In its place, we need approaches that are both more pragmatic and more politically inclusive -- rolling with the waves, instead of trying to stop the ocean.” ([Learning to bounce back. The New York Times. November 3, 2012](#))

That resilience is the key is also earlier mentioned, two months before hurricane Sandy. *“And in any case, Mr. Freed said, you can’t make a climate-proof city. So city officials are pursuing a so-called resilience strategy that calls for strengthening the city’s ability to weather the effects of serious flooding and recover from it.”* ([New York is lagging as seas and risks rise, critics warn. The New York times. September 11, 2012](#)) The new buildings codes revealed after hurricane Sandy, should help to make New York City resilient towards climate extremes. *“Mr. Bloomberg unveiled the work of a task forces whose recommendations, once put in place, would make the city a leader in the national effort to overhaul codes so that buildings would be more resilient to natural disasters.”* ([Push to prepare city’s buildings for next storm. The New York Times. June 14, 2013](#))

To conclude, the shift that has taken place in flood management looking at the measures is partly visible in New York. Although the focus still seems to be on vulnerability reduction, New York is also hinting at hazard reduction. The shift is also visible with the concept of resilience. But the use of the concept of resilience in the newspaper articles is not always similar with the definition given in the literature. Besides the measures, the shift in flood management also refers the shift in the public-private divide, the involvement of actors.

4.3.3 Responsibility for public or private actors?

The literature revealed a shift in flood management, whereby new public and private parties are involved in the process of flood management. Furthermore, Meijerink and Dicke (2008) stated that a shift has taken place from flood management as a pure collective good towards the integration of many actors. This shift should have an influence on the public-private divide. But the flood management tradition showed that already many public as well as private actors are involved in the process of flood management, but it is hard to define the responsibilities for each actor. An example can be given of New Orleans, as this is an American coastal city as well and it had also to deal with a big flood disaster eight years earlier. After hurricane Katrina: *“Public projects have lagged far behind the private sector in the rebuilding process, [...]. Blame for the slow progress could be spread across local, state and federal agencies and on the catastrophic size of the disaster, [...].* Five years after the disaster, public projects are still behind the private sector. *“Much of the delay came from differences between city staffers and federal regulators on the damage’s costs, [...].”* (\$700M in federal aid finally flowing to N.O.; Mayor: city to get busy rebuilding this year. USA Today. March 18, 2009) More money is needed for the recovery of New Orleans.

Who is responsible is one of the most important questions which have to be asked when looking at the flood management discourse of New York. The previous example showed the difference between public and private projects. Another example is the flood defenses, private actors as well as public actors, but also local people are held responsible.

“There are thousands of levees nationwide -- the government has no precise number -- that aren’t subject to federal oversight, often because they were built by local or private sponsors. And many big levees, including some on the Mississippi River and around New Orleans, are federal projects where the corps handles major maintenance itself.” (U.S. cracks down on worn levees; 114 flunked by corps lose aid. USA Today. February 24, 2009)

Local and private sponsors do not have enough money to maintain the flood defenses, which causes an area that is not well protected against floods. *“Many of the levee boards don’t have the funds to maintain them and really haven’t... for years, [...].”* (U.S. cracks down on worn levees; 114 flunked by corps lose aid. USA Today. February 24, 2009) It is not a recent problem, but has been there for years. There are too many actors involved which make the maintenance of flood defenses too fragmented.

Looking further into responsibilities, relocating and rebuilding of houses and buildings in floodplains is an interesting topic of conversation. It is not only a discussion about people living and rebuilding in

floodplains, but also about insurances. It is a discussion from the last years, but it is already visible in 1999 when hurricane Floyd hits New Jersey,

“It would probably be cheaper for society in the long run, the medium run, to buy up those properties that were in the flood plain and then relocate them, because those properties are going to be flooded again and again and again, said Professor Mitchell, [...]” (After the flood; with a billion of dollars in damage, New Jersey will be wringing out a long time. The New York Times. October 17, 1999)

It can be said that Professor Mitchell was right that those properties are going to be flooded again and again, as hurricane Irene passed by in 2011 and hurricane Sandy in 2012. Furthermore, he stated in 1999 that, *“To Prof. James K. Mitchell, director of graduate studies in the geography department at Rutgers University, the best way to survive may simply be to move.”* People have to take their own responsibilities as well, as Loucks et al (2008) pointed out people are weighing the costs and benefits. *“After all, housing is cheaper in a flood plain than in the hills”.* (After the flood; with a billion of dollars in damage, New Jersey will be wringing out a long time. The New York Times. October 17, 1999) Why not living in a floodplain than if that is cheaper?

After hurricane Sandy, the government tried to let people think about rebuilding in floodplains. *“For owners of homes that were substantially damaged and are in the most flood-prone areas, the buyout program will pay 100 percent of their prestorm market value. Homeowners in high-risk areas will receive a bonus to encourage them to move.”* But it is questionable if people take this offer. *“It’s up to the homeowner, and the vast bulk of homeowners are deciding to stay right where they are and rebuild, Gov. Andrew M. Cuomo said at a news conference in Albany.”* Besides that, *“Both state and city officials said they would help homeowners who choose to rebuild to do so in ways that would be more resistant to storm damage in the future.”* (Homeowners in flood zones opt to rebuild after hurricane, not relocate. The New York Times. April 27, 2013) It is striking that the government a half year after hurricane Sandy comes up with the suggestion of paying people to get them relocate. This has to be done right after the disaster. Furthermore, state and city officials help rebuilding houses with building codes. This is not the way to support people moving. But prohibiting floodplains is also not an option, as the costs will run up too far. For New Orleans, it was the same case as for New York City, after hurricane Katrina. *“There’s no prohibition on rebuilding in places that have always been vulnerable to flooding -- and still are. [...] all across the city, homeowners are rebuilding homes the old way, in harm’s way, because the city and the state have not yet said they can’t.”* (New Orleans’ recovery slow and slippery process; rebuilding underway but in the same flood-prone places. USA Today. August 23, 2006)

A private actor who is involved in the issues on relocating and rebuilding houses and buildings are the insurance companies. *“The federal government’s flood insurance program, [...], is one of the world’s largest. The insurance is mandatory for homeowners with a federally backed mortgage if they live in an area subject to flooding at least once every 100 years.”* But not everyone has such insurance even though they live in an area with at least once every 100 years a flooding. Also in areas just outside of the once every 100 years a flooding, people are not insured against floods. *“The pending costs for Hurricane Sandy would have been even higher if a greater share of residents along the East Coast had signed up for insurance, which is voluntary outside the 100-year flood zones.”* (Flood insurance already fragile faces new stress. The New York Times. November 13, 2012) Here, as well, there can be referred to New Orleans. *“A minority of the U.S. homeowners have flood insurance. In the areas affected by Katrina, for instance, 34% of homes and 23% of businesses had the policies, which cover most water damage.”* But that homeowners do not have insurance for floods is not only the lack of the people living in floodplains. *“Homeowners’ policies issued by private insurers cover wind-related losses but not flood damage.”* (FEMA halts flood insurance payments. USA Today. November 17, 2005) People have to rely on the Federal Emergency Management Agency to get their money for their damaged house, if they are insured. Private insurance companies do not release any money to people with flood damage.

The debate keeps going on in how people should be insured, if people even should live in flood risk areas or that building codes should be provided. More recent, after hurricane Sandy:

“FEMA, as a result of this year’s legislation, has the authority to raise premiums by as much as 25 percent per year over the next five years. The increase will be imposed mostly on vacation homes and other properties that repeatedly flood, but whose owners have paid far below market insurance rates. The legislation also authorizes the creation of a national reserve fund to help the program handle major flood catastrophes, and urges Congress to appropriate \$400 million a year to update the thousands of out-of-date flood control maps.”

This should lead to, *“[...] force new homes to be built elevated off the ground in spots where rising sea levels or recent major storms have had an impact.”* Houses should become more expensive in flood risk areas. People have to be made aware of the risks they are facing. *“People are being killed and their properties are being destroyed because of a government that gives the false impression that there is less of a flood risk than there really is.”* (Flood insurance, already fragile, faces new stress. The New York Times. November 13, 2012)

In the end, all these problems are related to one thing: who is responsible for what? According to the newspaper articles, the government should do more about making people aware of the risks for living in floodplains. Also, flood maps have to be up to date. Besides that, it has to be clear who takes care of insurance and when people get paid.

4.3.4 *The development of the flood management discourse, vulnerability reduction*

Thinking about flood management starts with thinking about climate change. In 1997, the United States did not support the Kyoto agreement. People were skeptical about climate change and global warming. “[...] the Clinton Administration has not made flood management a high priority and, as a result, local officials have not acted fast enough or forcefully enough to encourage people to leave areas that are at risk.” (Flood-control policy shift is meeting scant. *The New York Times*. March 19, 1997) The view on climate change has shifted in the last decade. Still, people are skeptical about it, but the effects of climate change are recognized by the United States as something the country needs to deal with the coming decades. New York is struggling with the effects of climate change in combination with urbanization.

“But what works along vast expanses of shoreline is less suited to cities that are densely populated. Jolted into a new reality by Hurricane Sandy -- which hit not only communities of bungalows but urban areas stacked with high-rises -- experts said that coastal cities must figure out a new approach to hurricane preparation and recovery.” (Hoboken Mayor seeks storm protection more suitable for high-rise buildings. *The New York Times*. February 13, 2013)

Furthermore, it is stated that, *“while the mayor said he would aggressively pursue a rebuilding of the damaged waterfront, he warned that there are no panaceas or magic bullets to protect the city fully.”* (Mayor pledges to rebuild and fortify coast. *The New York Times*. December 7, 2012) It is hard to just simply change the flood management discourse. Coming back to the Dutch way of dealing with floods, “[...] replicating Dutch successes in the United States would require a radical reshaping of the American approach to vulnerable coastal areas and disaster prevention.” Furthermore it is said that, *“The U.S. is excellent at disaster management, but working to avoid disaster is completely different from working after a disaster.”* (Lessons for U.S. from a flood-prone land. *The New York Times*. November 15, 2012)

A window of opportunity might be a chance for New York to make a shift in discourse. In the Netherlands, flood management became important after a big flood disaster in 1953 which killed a lot of people. New Orleans started thinking about flood management more often after hurricane

Katrina. *“If you look at the European experience, said Professor Bowman, referring to surge barriers built or under construction in the Netherlands, London and Venice, it took up to 45 years in some cases, after a major catastrophe, before the barriers were built.”* ([How safe is my home? The New York Times. March 11, 2007](#)) Maybe, hurricane Sandy will do the same for New York.

“For New York sea gates alone won’t fix the city’s problems any more than will porous streets with catchment basins and waterproof vaults under sidewalks to secure electrical systems. At the same time this is a golden opportunity for the United States to leapfrog countries that have pioneered innovative architecture like garages doubling as floodwater containers and superdikes serving as parks and high-density housing complexes -- a chance for designers, planners and engineers finally to get back, after so many decades, to the decision-making table.” ([Vetoing business as usual after the storm. The New York Times. November 20, 2012](#))

To conclude, the image that is created of the flood management discourse in New York by the mass media is a country that struggles with climate change, measures in flood management, water safety norms and responsibilities. From 1997 with the Kyoto agreement till 2012, hurricane Sandy and in 2011 hurricane Irene, all kind of events that could have been a window of opportunity in the development of the flood management discourse.

For a long time, the United States has been skeptical about climate change. This has changed over time. Recent hurricanes have given insight that despite of if climate change is the cause or not, it has to be taken into account in dealing with a rising sea-level and the increase of climate extremes. The skepticism on climate change can be linked to the focus on flood management, vulnerability reduction. Flood management has never been a high priority. Because every state, every region or even every city has to deal with their own natural disasters, it is hard to focus on one natural disaster (Netherlands US Water Crisis Research Network, 2012). Evacuation planning is something that can be organized for multiple natural disasters. But, with hurricane Katrina, Irene and Sandy, the discussion started on a shift in flood management towards hazard reduction, the implementation of dykes or living with the water, by the implementation of soft infrastructure. More needs to be done to protect a city like New York. Besides the seemingly shift from vulnerability reduction towards hazard reduction, it is also important to think of the responsibilities. As every region deals with their own natural disasters and evacuation planning is organized by the federal government, who is responsible for what in flood management is fragmented. The federal government takes care of evacuation and making flood maps, but the responsibilities for flood defenses all over the country is diverse. Local governments, state governments, as well as local people are held responsible for maintaining the

flood defenses. The same is true for insurances. The federal government is taking care of flood insurance, as private insurance companies insure anything except damage done by floods. The Federal Emergency Management Agency, who takes care of the insurances, is getting in trouble because of people living and rebuilding in floodplains. This costs a lot of money. This discussion is mostly visible right after a big flood disaster. Linked to this problem are the water safety norms, the flood maps made for New York are not up to date. The flood maps are based on data coming from 30 years ago. People are not even aware of the fact that they need to insure or cannot rebuild their houses.

Looking at the discourse structuration in newspaper articles, it becomes clear that hurricanes are seen as a window of opportunity. It starts discussions on climate change, different ways of protection, responsibilities and water safety norms. Instead of the beginning of the century where people were skeptical about climate change, it is now accepted and seen as something that needs to be taken into account. Thinking of the development of the flood management discourse in newspaper articles, it seems that the New York wants to make a change in protecting the city, but it is still not clear how to do this exactly.

4.4 Discourse institutionalization, taking responsibility

New York wants to make a change, according to the language used in newspaper articles. The flood management discourse has developed over time. Although the focus still seems to be on vulnerability reduction, New York hints at hazard reduction whereby hurricanes are seen as the window of opportunity. Besides the influence on the newspaper articles, the flood management tradition also influences the policy field of flood management.

The newspaper articles revealed struggles and discussions in flood management. The policy field analysis will show if the struggles and discussions are considered and taken in mind in the policy field. It will reveal if the language is solidified into the institutions, that is to say in the institutional context, the policy document and in the responsibilities of actors. This section refers to step 3 of the conceptual framework. First, an institutional context will be given which provides information about who is involved in the process of flood management. From there I will move on to the different elements which are relevant in looking at the development of flood management discourse, the perceptions on climate change, the measures taken in the protection against floods and the public-private divide, the involvement of actors.

4.4.1 *The institutional context*

The Netherlands US Water Crisis Research Network (2012) made clear that because of the size of the country, the United States deals with all kinds of natural disasters. Floods are standing low on the priority list. This results in the fact that people are used to take their own responsibility. *“The American society is much less controlled by the government, much more individualistic [...]”*ⁱⁱ (Hollandse waterkennis moet New York redden. Algemeen Dagblad. April 30, 2013) Meijerink and Dicke (2008) argue that there is no believe in flood management as a common good, which is due to the size of the country. Therefore, flood management is fragmented and organized by a lot of public and private actors.

Beginning with flood management on the national level, it starts with the Department of Homeland Security. This department is *“formed in 2002 from the combination of 22 departments and agencies, [...] The Department’s work includes customs, border, and immigration enforcement; emergency response to natural and manmade disasters; antiterrorism work; and cybersecurity”* (USA government, 2013). Derived from the Department of Homeland Security, there is the Federal Emergency Management Agency (FEMA). The FEMA *“supports our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards”* (Department of Homeland Security, n.d.). The FEMA has classified regions. New York is part of region 2. *“When the President grants a federal disaster or emergency request, the Federal Emergency Management Agency activates to support the state”* (Federal Emergency Management Agency, n.d.). Derived from the federal government, there is the Office of Emergency Management (OEM) on the state level, which *“routinely assists local governments, voluntary organizations, and private industry through a variety of emergency management programs including hazard identification, loss prevention, planning, training, operational response to emergencies, technical support, and disaster recovery assistance”* (Office of Emergency Management, n.d.). Last in line, looking at the involved governments, is the local government, The City of New York. The OEM has an office in New York City as well. The OEM *“plans and prepares for emergencies, educates the public about preparedness, coordinates emergency response and recovery, and collects and disseminates emergency information”* (The City of New York, n.d.).

One thing that becomes clear and is visible on all government scales is that the focus in flood management is on flood response and preparedness, the focus is on vulnerability reduction. An interesting plan to look at for New York is PlaNYC 2030. PlaNYC 2030 is a plan made by The City of New York, initiated by Mayor Bloomberg. The plan should, *“prepare the city for one million more*

residents, strengthen our economy, combat climate change, and enhance the quality of life for all New Yorkers” (The City of New York, n.d.). Here, it will become visible that besides the different governments, just a few private actors are involved in the process of flood management in New York.

4.4.2 Combat climate change

PlaNYC 2030 consists of several subjects, like public engagement, economic opportunity and solid waste. For this thesis, it is relevant to take a look at climate change. The overall goals for ‘Climate Change’ are:

- Reduce greenhouse gas emissions by more than 30%
- Increase the resilience of our communities, natural systems and infrastructure to climate risks

The overall goals can be divided into various goals, which can be seen in figure 4.3. A view goals can be linked to the policy field of flood management, ‘*assess vulnerabilities and risks from climate change*’, ‘*increase the resilience of the city’s built and natural environment*’, ‘*increase the city’s preparedness for extreme climate events*’ and ‘*create resilient communities through public information and outreach*’ (The City of New York, 2013). The concept of resilience is mentioned a lot in the goals in climate change, whereby resilience is referred to making communities and buildings resilient.

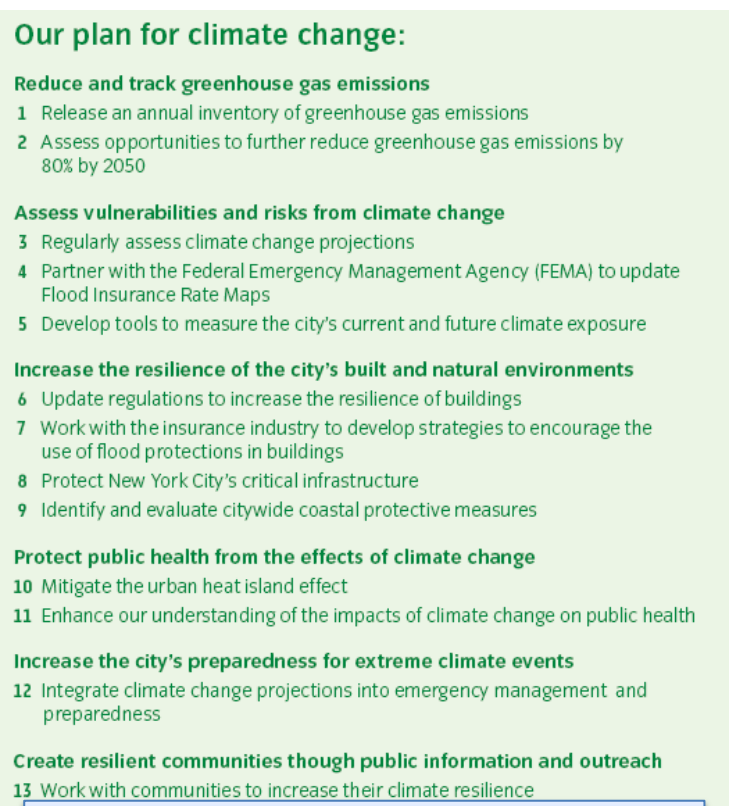


Figure 4.3: Our plan for climate change. Source: The City of New York, 2013

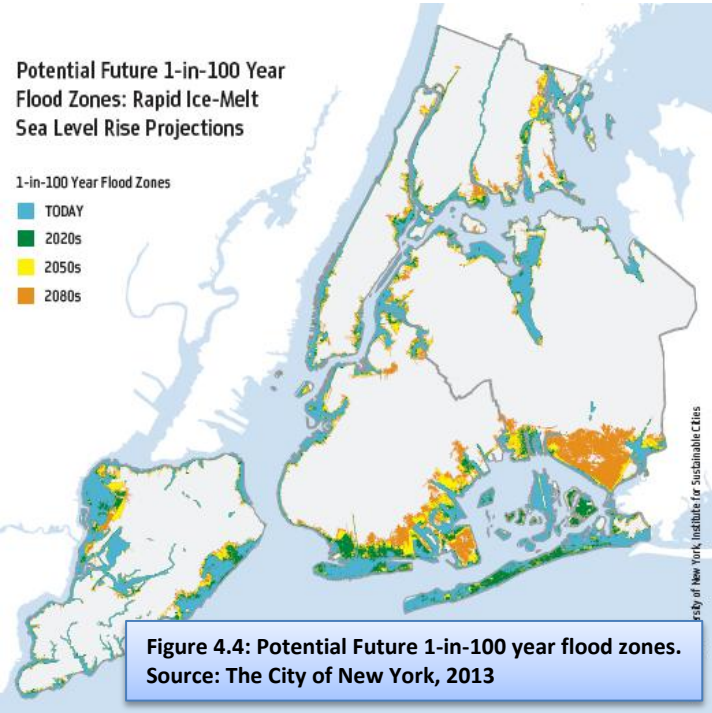
There is nothing skeptical about climate change in PlaNYC 2030.

“Cities are at the forefront of both the causes and effects of climate change. Urban areas are estimated to be the source of approximately 80 % of global greenhouse gas (GHG) emissions. At the same time, urban areas located on a coast like New York City face increased climate risks. Accordingly, cities have a responsibility to deal with both the causes and effects of climate change.” (The City of New York 2013, p. 150)

Furthermore it is stated that New York, *“always faced climate risks, including heat waves, snow storms, high winds, tropical storms, storm surges, lightning, and torrential downpours. These events affect every New Yorker, and as our climate changes, they will become more frequent and severe.”* (The City of New York 2013, p. 150) The effects of climate change have been recognized and have to be taken into account, New York combats climate change. To fulfill the goals mentioned in the part of climate change, measures have to be taken.

4.4.3 Focusing on vulnerability reduction, tending to hazard reduction

The literature has revealed that the focus in flood management is on vulnerability reduction, by making evacuation plans, early warning systems and making buildings resilient towards floods. PlaNYC 2030 reveals that the focus is still on vulnerability reduction, despite of discussions that were



going on in the newspaper articles. One of the main measures which have to be taken is creating flood maps and climate change projections. Figure 4.4 shows the updated flood map. Furthermore, the city needs to be better prepared, by making buildings resilient and creating building codes for buildings and infrastructure. A new concept which is introduced and can be linked to making buildings resilient is freeboard. Freeboard refers to a specific height for buildings above the FEMA-designated flood level. The implementation of

freeboard should be mandatory of critical buildings like hospitals (The City of New York, 2013).

One of the most important measures mentioned in the plan is emergency management. According to the program, *“New York City already has one of the world’s leading local emergency management departments, capable of planning for and responding to climate-related events.”* (The City of New York 2013, p. 159) To stay leading in emergency management, New York needs to implement the updated climate change projections to make sure that the response to disasters is as effectively as possible. Linked to emergency management is making information available, like flood maps, information on coastal storms, climate change projections etc.. An example is Notify NYC. This is a

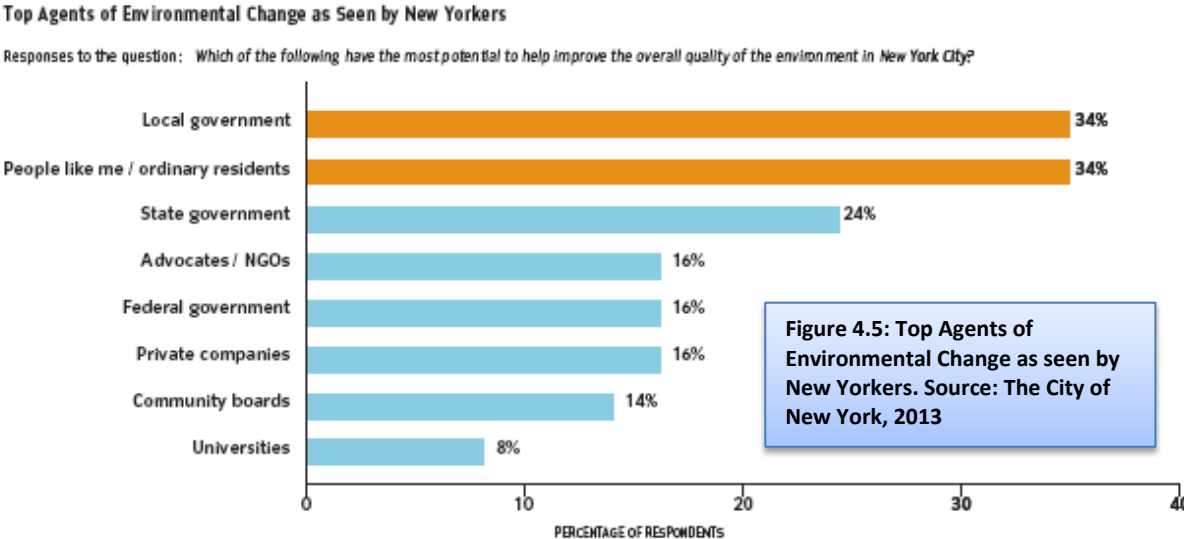
public warning system that sends emergency alerts directly to residents by email, text message or telephone.

Besides the focus on vulnerability reduction, New York is taking a look at new ways of dealing with floods which tends to hazard reduction. For city wide coastal protective measures, New York is looking at countries like the Netherlands and Germany. Rotterdam *“built a system of massive sea walls and storm surge barriers that work in conjunction with a network of dykes, levees, pumping facilities and building-scale measures to protect the city from flooding”* (The City of New York 2013, p. 158). Hamburg designed a neighborhood that can flood periodically. Creative thinking on possible solutions for flood management is needed. An example for a creative solution in New York City is the project ‘On the Water: Palisade Bay’. This project examined options for storm surge attenuation using soft infrastructure like wetlands (The City of New York, 2013).

Like the literature and the newspaper articles, it becomes clear that New York still focusses on vulnerability reduction. The discussion in the newspaper articles about a different way of dealing with floods have likely caused in looking at citywide coastal protective measures, like the implementation of hard and soft infrastructure. Apart from looking at hazard reduction, the most striking thing mentioned in PlaNYC 2030 is the involvement of the insurance industry. Insurance rate maps have to be updated and the insurance industry has to encourage the use of flood protections in buildings and houses.

4.4.4 *The involvement of private actors*

The institutional context has revealed the involvement of public actors in dealing with floods. But there also private actors involved in flood management. The local government has done a research



on who has to be involved in helping improving the environment of New York. The following question was raised: Which of the following have the most potential to help improve the overall quality of the environment in New York City? Most of the people responded with the answer, local government and people like me/ordinary residents (figure 4.5). This strengthens the local government to invest in the involvement of the people of New York in the process of making New York City a greater and greener place and thereby also involve the population in the process of dealing with climate change and flood risks (The City of New York, 2013).

Communities and individuals are getting involved in flood management, for example in thinking of new creative solutions in dealing with floods. Still, most of all, public actors are responsible for creating evacuation plans. Private actors are hardly seen in PlaNYC 2030. The evacuations plans are not specifically aimed at floods, but at natural disasters in general. Thereby the FEMA has the most important role. The FEMA is responsible for preparing, protecting against, respond to, recover from and mitigate to all hazards (FEMA, n.d.). One of the most important private actors that are mentioned is the insurance companies. The insurance industry has to cooperate with the FEMA when it comes to insurance rate maps which consist of properties in New York that are at risk of flooding (The City of New York, 2013).

4.4.5 *Vulnerability reduction, the flood management discourse*

What is commonly accepted in language, seen in the newspaper articles, and what has solidified into institutions, is the focus on vulnerability reduction in the flood management discourse. Thereby, it can be said that vulnerability reduction is the dominant flood management discourse, looking at the discourse structuration as well as the discourse institutionalization.

The policy field analysis has revealed that New York still focusses on vulnerability reduction, as was visible in the flood management tradition as well as the newspaper articles. The main focus is on emergency management provided by the federal government, the FEMA, as flood maps need to be up to date. New York hints at hazard reduction. Research is done by looking at other countries and thinking of creative solutions. *“Increasing our climate resilience in coastal areas will require us to consider both traditional and new, more creative solutions.”* (The City of New York 2013, p. 158)

With PlaNYC 2030, flood management seems to become less fragmented. This is due to the fact that everything is brought together in one plan for New York. Public actors, private actors and individuals have to work together in combatting climate change. All actors have to communicate and cooperate with each other. The city wants to become resilient in a sense of “[...], not only must GHG emissions

be curbed, but we must increase the city's climate resilience - our ability to withstand and recover from extreme events and environmental changes." (The City of New York 2013, p. 150) New York has to be less vulnerable.

Overall, the flood management discourse, derived from the policy field, is still focused on vulnerability reduction, especially emergency management, but New York is looking into new ways of dealing with climate change and floods which focusses more on hazard reduction. With PlaNYC 2030, more actors seem to be involved in the process of flood management whereby communication and cooperation is important.

4.5 Reflection

In this thesis, a secondary literature research, a newspaper analysis and a policy field analysis were conducted of how the flood management discourse has been developed in New York and what kind of events have had influence on the development. Vulnerability reduction can be seen as the dominant flood management discourse in New York. The ideas and concepts commonly accepted in New York are focused on vulnerability reduction. These ideas and concepts are also solidified into institutions, visible in PlaNYC 2030. But the dominant discourse seems to change, as New York is looking more into new creative solutions which can be linked to hazard reduction.

The results of the secondary literature research, the newspaper analysis and the policy field analysis revealed that the flood management tradition shows a focus on vulnerability reduction. This is visible as well in the newspaper articles and in the policy field. An event like hurricane Sandy does have an effect on the discussion in how to protect New York, which is especially visible in the newspaper articles. Therefore, hurricane Sandy is seen as a window of opportunity. Also the policy field analysis revealed that New York is looking into creative solutions, aimed at hazard reduction, but the solutions have not been implemented yet.

Thinking of the public and private actors, it seems that flood management is becoming less fragmented in New York. PlaNYC 2030 brought all relevant public and private actors together as well as the citizens to cooperate and communicate with each other to combat climate change and thereby floods. The flood management tradition, also revealed in the newspaper analysis, shows some struggles in flood management. For example outdated water safety norms, but the policy field analysis has revealed that the flood maps are made up to date. Another struggle was the responsibilities which especially have to do with insurances. Even though the FEMA is going to

cooperate with the insurance industry on making insurance rate maps, the answer on the question who is responsible remains unclear as people can keep on rebuilding in floodplains.

Reflecting on the theory about the shift in flood management, it can be said that the shift is only partly visible in the newspaper articles and the policy field of flood management in New York. New York still seems to focus on vulnerability reduction, but the city also tries to implement new measures in flood management linked to hazard reduction and also vulnerability reduction. A difference with the theory can be found in the concept of resilience. Resilience has been described different in the newspaper articles and in the policy field than in the literature. The literature refers to resilience as a concept which takes everything in mind, hazard reduction, vulnerability reduction and exposure reduction, while the newspaper articles and the policy field defined resilience most of the times as a way for communities to come back from a disaster. Looking further at the shift in flood management, it is visible in both the newspaper articles as well as the policy field that more actors are getting involved in the process of flood management. Communities and individuals, for example, are also communicating and cooperating with public and private actors about flood management. In the end, it can be concluded that the shift in flood management seems to be a shift in language and not a shift in practice.

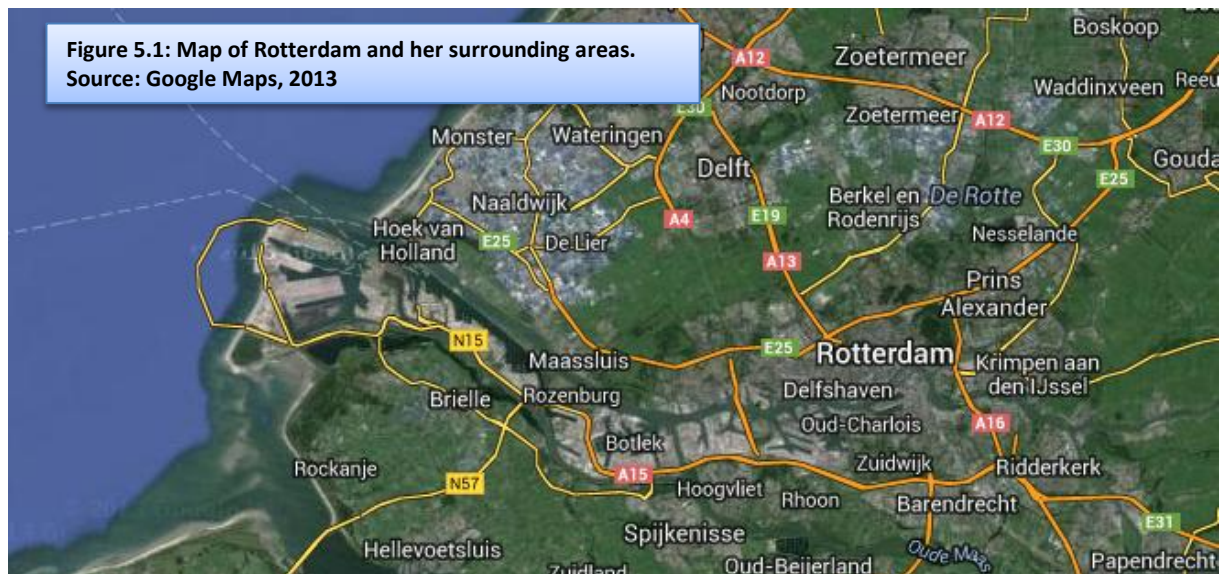
In the next chapter it will become clear how the flood management discourse in Rotterdam has been developed.

Chapter 5: Rotterdam, hazard reduction

Rotterdam is the other urban coastal city that is analyzed in this thesis. First, an introduction will be given about the case study, Rotterdam. What follows is the flood management tradition in Rotterdam. It reveals the cultural influence on flood management and shows which decisions are made and why these decisions are made in flood management. The newspaper analysis and the policy field analysis are divided into a few elements which reveal the development of the flood management discourse. These elements are the perceptions on climate change, the measures taken in flood management and the public-private divide.

5.1 Introduction on Rotterdam

Rotterdam is surrounded with water, as can be seen in figure 5.1. There is water coming from the North Sea. Furthermore, there is water coming from the big rivers in the Netherlands, the Rijn and the Maas. The effects of climate change are visible in Rotterdam as the effects likely cause a rising sea-level and the increase of heavy rainfall and storms. Rotterdam is lying below sea-level and therefore a rising sea-level can cause a lot of trouble for the city. In the beginning of 2012, the



Netherlands had to deal with heavy rainfall which caused a rising sea-level and a rising water level in the rivers (ANP, 2012d). If this is happening more often, the Maeslantkering (the flood defense near Rotterdam) has to close more frequently (Rijkswaterstaat, n.d.a). Besides the increasing flood risks, Rotterdam is a highly populated city and because of the harbor, Rotterdam is an important economic city as well. Major interests are at stake. The way Rotterdam deals with floods is different from New York, likely influenced by cultural differences. The influence of culture will be visible in the next section, which can be linked to step 1 of the conceptual framework.

5.2 Flood management tradition: hazard reduction

“26% of the country lies below sea level and two-thirds would be regularly inundated without protective dykes even in a normal situation, a cooperative system of flood risk management has been an essential part of life to fight the water” (Terpstra and Gutteling 2008, p. 556). Because a large part of the Netherlands deals with flood risks, flood management has always been a matter of national protection. The big flood disaster in 1953 resulted in a lot of deaths, as well as damage, which resulted in the implementation of dykes and storm surges. The government realized that the Netherlands was in a vulnerable position when it comes to floods and that the government had to do something about this (KNMI, 2003).

The Dutch practice has always focused on hazard reduction. But a shift has taken place within hazard reduction. In the past soft infrastructure measures were implemented instead of hard infrastructure. *“Don’t fight the sea with brute force but with soft persuasion.”* (Bijker, 1996 in Bijker 2007, p. 145) This view changed in 1953. The big flood disaster in 1953 has had a huge impact on flood management in the Netherlands. *“The effects have been traumatic - at the individual level, for the Netherlands as a country, and for the coastal engineering profession.”* (Bijker 2007, p. 146) This disaster could never happen again, which resulted in a shift within hazard reduction with the implementation of hard infrastructure. *“Dutch perception of and methods for dealing with the risks of flooding by storm surges, can only be understood by reference to De Ramp (the disaster).”* (Bijker 2007, p. 147) This is why the *“Dutch practice is primarily aimed at keeping the water out”* (Bijker 2007, p. 147).

After 1953 storm surges were also built nearby Rotterdam to protect the city, whereby the tidal outlets of the rivers were closed. The Maeslantkering is one of the newest additions to the network of flood defenses. Like another storm surge barrier, the Maeslantkering remains *“open under normal circumstances, but could be closed by a series of sliding doors when a storm surge was forecasted”* (Bijker 2007, p. 147).

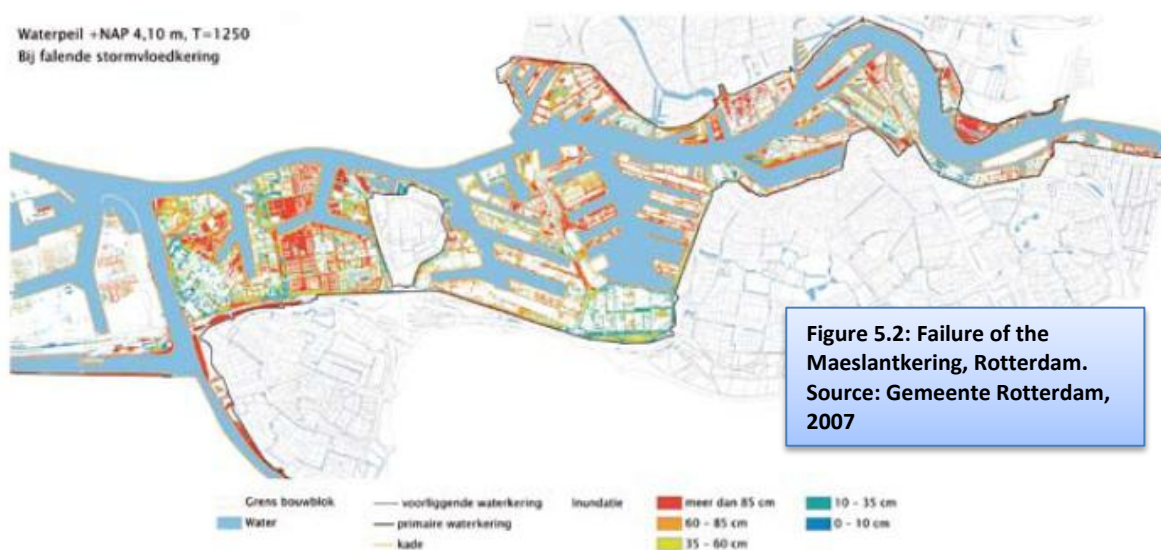
The Netherlands belief in flood management as a common and collective good, which will also be visible in the policy field analysis. Flood management is something that the government should define and protect (Meijerink and Dicke, 2008). Especially after the big flood disaster, it was important to protect the country. Thereby, flood management has always been focused on hazard reduction. Within hazard reduction a shift has taken place, from soft infrastructure, *“joining hands with nature”* (Bijker 2007, p. 145) to hard infrastructure, by implementing dykes and storm surges (Bijker, 2007; Meijerink and Dicke, 2008). The implementation of hard infrastructure does also have

downside. After 1953, the national government took care of flood management. This had consequences for the Dutch population, 'the government will take care of it'. *"The Dutch have invested mainly in reducing the probability of flooding, the consequence of this being a lack of flood awareness amongst the Dutch population"* (Meijerink and Dicke 2008, p. 507). Furthermore it is stated that,

"With the large amount of expertise on flood protection, the high safety standards of Dutch flood defenses and no substantial governmental risk communication, it can be expected that the average Dutch individual has a low sense of urgency for thinking about his own responsibility in taking risk mitigation activities." (Terpstra and Gutteling 2008, p. 556)

The feeling that is created among the population is a country well protected against floods with flood defenses which have high water safety norms. These flood defenses create a sense of safety. People expect to be safe behind a flood defense, while most of the times this is not the truth. *"The last weeks we have experience flooding in the Netherlands. People were visibly struggling to keep the water outside. Still, the chances to be hit by nature in this way are underestimated."*ⁱⁱⁱ ([Kans op ovestroming huis wordt onderschat. De Telegraaf. September 1, 2010](#))

A lack of awareness cannot be held responsible for the population only, as the government has created this lack of awareness. People do not know that water safety norms are not up to date. Loucks et al. (2008) pointed out that a flood can occur once every 10.000 years in the Netherlands. *"It is considered to sharpen the norms for the dykes. The risk of flooding for sea dykes is once every 10.000 years. But that is set in 1960."*^{iv} ([Miljarden in droge-voetenfonds - Hollandse kust moet stuk breeder. Algemeen Dagblad, September 3, 2008](#)) This quote reveals that the water safety norms are outdated, based on information from 60 years ago. Furthermore it is stated that, *"[...] annually a small probability of failure: average once every 10.000 years. This seems like a long shot, but [...] requirements for aircrafts are set with a far smaller probability of failure."*^v ([Dijken onder de loep. De Telegraaf, December 8, 2012](#)) Compared to other countries, the water safety norms in the Netherlands are very high, but comparing the water safety norms with other policy fields, safety norms should become higher. Especially, when thinking of the risks, a flood can cause a lot of damage which was visible in 1953 as well. Also in Rotterdam, it is visible that flood defenses are not meeting the water safety norms as well as the probability of failure. *"Experience shows that the Maeslantkering does not meet the current safety norms in terms of the probability of failure."*^{vi} (Gemeente Rotterdam 2007, p. 40) This can have an impact on the amount of floods that can occur. Figure 5.2 reveals the impact of a flood when the Maeslantkering could not close. The red color reveals more than 85 centimeters of water.



As times goes by, flood management discourse develops, “one of the focal points is the divide between public and private responsibilities in flood risk management” (Terpstra and Gutteling 2008, p. 556). The literature has revealed that flood management in the Netherlands is a public good resulting in a lack of awareness among the population. Private actors and citizens should be more involved in flood management. The responsibility should be divided among different actors instead of the government as the only responsible for flood management. This will also result in better safety as people are made more aware of the situation.

To conclude, the flood management tradition in Rotterdam focusses on hazard reduction. In the past the focus within hazard reduction was on soft infrastructure, working with nature. After 1953, the view shifted towards the implementation of hard infrastructure by building flood defenses. The national government is the one taking care of flood management which results in a lack of awareness among the population as dykes give a fake sense of safety. For now, building dykes is enough to protect Rotterdam, but it cannot be said if this is enough for the future.

5.3 Discourse structuration, a shift within hazard reduction

The flood management tradition has an influence on how the flood management discourse will develop over time in Rotterdam. An event like the big flood disaster in 1953 or the flooding of the rivers in 1993 and 1995 were used as window of opportunities, a chance to rethink flood management. It resulted in flood management as a public good and a shift within hazard reduction. The last decade, there have been no windows of opportunities for Rotterdam, thinking of big flood

disasters. If the flood management discourse still has developed in the last decade will be visible by looking at the language in flood management revealed by newspaper articles. This can be referred to step 2 in the conceptual framework. In total 107 articles have been analyzed of two of the biggest newspapers, De Telegraaf and Algemeen Dagblad. Articles were found from 2000 until 2013.

This section is divided into three elements. The first element is the perceptions on climate change as the effects of climate change in combination with urbanization likely cause more floods. The second element is the measures taken in flood management. The flood management tradition of Rotterdam has revealed that the city is focusing on hazard reduction (Bijker, 2007; Meijerink and Dicke, 2008). The third element is the shift in the public-private divide, which tells something about the involved actors. The literature revealed that flood management has shifted from task of the state towards the involvement of new public and private actors (Meijerink and Dicke, 2008). The flood management tradition refers to the state as the provider of flood management. If this is still the case will become clear. In the end, all the elements will be brought together and show how the flood management discourse is visible in newspaper articles, which new concepts and terms have become popular, what kind of measures are mentioned more over time, how important are water safety norms, what is the role of insurance companies.

5.3.1 Perceptions on climate change

In the Dutch newspapers, different views on climate change appear over time. Sometimes, climate change is seen as the cause of more extreme weather and the rising sea-level, in other articles a big impact on the climate is caused by human activities. Yet other newspaper articles state that climate change cannot be proven. The view on climate change given by the media differs. *“Global warming and climate changes push the sea-level along the Dutch dykes the coming forty years with 30 to 60 centimeters high.”*^{vii} (Rampen dreigen achter de dijken. De Telegraaf. April 21, 2009) Even in recent years, different views are visible when it comes to climate change, as can be seen in the previous and coming quotes.

“The storm reminds of all the predictions of climate change. In the Netherlands, climate change would create extreme weather: more snow in the winter, periods with drought - [...] - and more rain in the summer, which in a short time comes down local. Just about what happened in recent days, but still Harry Geurts of the KNMI does not see a prove of climate change.”^{viii} (Fikse schade door donder en bliksem. Algemeen Dagblad. August 27, 2011)

Also in 2007, a different view on climate change is shown.

“As if the devil plays with it: calculated during the heavy storm yesterday the most important Dutch climate scientists launched an anxious report on the consequences of climate change for the Netherlands. Heavy showers, heat waves, flooding rivers, they are perfectly normal.”^{ix} (Help, Nederland. De Telegraaf. January 19, 2007)

Climate change is a hot topic. This is not only visible in recent years, but in the early 2000's as well. *“The fl2,6 billion which is being spent each year is totally inadequate to cope with the effects of climate change, sea level rise and subsidence, [...]”*^x (Strijd tegen water kost 25 mld. De Telegraaf. August 31, 2000)

Apart from the fact that climate change is the cause of the rising sea-level and more climate extremes or not, the media seems to agree on the possible influence of people on climate, in 2007 as well as in 2009. There is a possibility that human activities are influencing the changes in climate as a rising sea-level or climate extremes. *“De researches, supported by 21 scientists and other experts, are clear about one thing: the climate changes can only be explained by human influences.”*^{xi} (Help, Nederland. De Telegraaf. January 19, 2007) The human influences on climate change is also caused by an increasing population and urbanization in coastal areas. *“The risks shall be much bigger in a short time because of the concentration of people, businesses and goods in floodplains and coastal areas.”*^{xii} (Rampen dreigen achter dijken. De Telegraaf. April 21, 2009) According to the media, humans contribute to the effects of climate change. People are clustering in urban areas. Besides that, the population is still increasing. This causes a rise in the impact on the climate.

Different views in climate change in the last decades can be seen, not only in the Netherlands, but other countries too struggle with how to deal with the rising sea-level, climate extremes and urbanization over the world.

“As a scientist, I can only hope that it is not too late for the climate. Metz, who already said five climate conferences back that his children would manage it, but he was deeply worried for his grandchildren, annoyed by the politics, who gives misleading statements, but let down in the negotiations again.”^{xiii} (Weer een mislukte klimaatop. Algemeen Dagblad. December 11, 2010)

Dialogue between big countries from Europe, Asia and America is difficult. *“If the climate science was mistaking, than only in the speed that the earth is warming. But that has again not set the politics into action after the climate conference finished last night in Cancun.”*^{xiv} (Weer een mislukte klimaatop. Algemeen Dagblad. December 11, 2010) Every country seems to think differently about how to deal with climate change, climate extremes or a rising sea-level. That leads to conflicts

between countries. There is not one similar way to deal with climate change. It seems to be hard for countries to make big steps.

Looking at the consequences of climate change in the Netherlands, the biggest consequence would be floods caused by more extreme weather. More extreme weather can result in a rising sea-level. *“Research on the effects of climate change reveals that floods are a growing danger for the Netherlands.”^{xv} (Huiseligenaar wil zich best verzekeren tegen overstrooming. Algemeen Dagblad. January 19, 2010)* One of the examples of more extreme weather which causes floods, was in the beginning of 2012. The Netherlands had to deal with heavy rainfall, which led to high water levels. *“The acute threat of high water currently seems to be gone, but according to Vereniging Nederlandse Riviergemeente the decreasing water levels lead to another big danger: a reduced attention on water safety.”^{xvi} (Waterveiligheid verliest prioriteit. De Telegraaf. January 11, 2012)* People have a lack of awareness when the water goes down again, because the problem is not there anymore. Also in 2005, it already became clear the Netherlands has to deal with the water. *“We may experience water in high ground water levels, the rising sea-level, subsidence and lots more rainfall, warns Schultz van Haegen.”^{xvii} (Ruimte voor water. De Telegraaf. March 5, 2005)* The water is not a recent problem for the Netherlands, as the flood disaster in 1953 reveals.

Zooming in on the case study, Rotterdam is an important harbor and vulnerable to floods. That is why Rotterdam is the initiator of ‘Connecting Delta Cities’, which brings together delta cities over the world to talk about climate change and climate extremes. *“Delta cities from all over the world are soon guests for 3 days in Rotterdam to share their experiences in the field of climate change and extreme weather and to think of solutions.”^{xviii}* Besides that, Rotterdam has a program called Climate Proof, which also interests the Americans. *“Rotterdam itself will be in the interest with the program Climate Proof, for which mayor Ahmed Aboutaleb at the beginning of this month was invited by old-president Bill Clinton and has been to America to discuss this with for example mayor Bloomberg of New York.”^{xix} (Rotterdam houdt top deltasteden; Ervaringen delen over klimaatverandering. De Telegraaf. May 17, 2013)* Rotterdam has to take in mind that the city is in a vulnerable position, like other important cities at the coast. Therefore, it is a good thing that coastal cities are cooperating.

“A large part of the harbors worldwide are not calculated on even a small rise in the sea-level. They are threatened to get into serious trouble at the end of this century. The harbor of Rotterdam does not see any trouble for themselves because of the proper water defenses.”^{xx} (Meeste havens niet voorbereid op zeespiegelstijging. Algemeen Dagblad. May 25, 2011)

Coastal cities are vulnerable because of their position. *“Most of the harbors are, because of their location at the coast or estuaries, extremely vulnerable for the combination of a rising sea-level and*

storms.^{xxxi} (Meeste havens niet voorbereid op zeespiegelstijging. Algemeen Dagblad. May 25, 2011)

Coastal cities have to take in mind the consequences of climate change, because of the location of the city. Connecting Delta Cities can help to discuss different ways to deal with climate change and find possible solutions.

The debate on climate change will continue, but the effects of climate change as well as urbanization have to be taken in mind. With connecting delta cities, Rotterdam takes climate change into account. Several small floods are mentioned in combination with climate change. But if these small events will have influence on the development of flood management is unclear. It is more likely that the effects of climate change have influenced the flood management discourse.

5.3.2 Hazard reduction, the key to success?

The flood management tradition has revealed that Rotterdam focusses on hazard reduction, first by soft infrastructure and from 1953 by building dykes and storm surge barriers. Because of sufficient flood defenses, Rotterdam does not see any trouble for themselves in the rising sea-level for the coming decades. The media reveals different thoughts about the sufficient flood defenses. *“One out of three Dutch flood defenses are not meeting the safety norms. According to a test which is performed six times a year on 3767 kilometers dykes, dams and dunes.”*^{xxii} (Derde van de dijken is niet veilig genoeg. Algemeen Dagblad. November 30, 2011) The question could be raised if hazard reduction is still the key to success, or in more specific, is hard infrastructure still the key to success. From the past the focus was on soft infrastructure, after the big flood disaster the discourse changed towards the implementation of hard infrastructure, by building flood defenses. Without looking at if these flood defenses are sufficient or not, it is still one of the main solutions for keeping the water out in the Netherlands. Thereby, the United States takes a look at the Netherlands. *“The famous American tv-host David Letterman thinks that New York needs to take an example of the Dutch Deltaworks (Deltawerken). [...] The Americans are looking jealous to the Maeslantkering in the Nieuwe Waterweg, which closes in case of storm surge.”*^{xxiii} (David Letterman prijst Nederland om dijken. Algemeen Dagblad. November 9, 2012)

Although Americans come to the Netherlands to see the flood defenses, still the flood defenses are not sufficient. In the last decade, a discussion is going on if dykes should be heightened and strengthened, or that the Netherlands should think of new solutions. This discussion is visible in the beginning of this century in 2003. *“Dykes should be brought at the right height and strength. Building in floodplains cannot be done anymore. The rivers need this space as an overflow area.”*^{xxiv}

(Deltawerken in gevaar als we niets doen. De Telegraaf. January 31, 2003) A contrasting view is given a year later, in 2004.

“We cannot continuously go through with raising dykes, according to Saeijs. A simple calculation gives him right: a dyke from the twelfth century ([...]) had, over a length of 100 meters, a volume of 6000 cubic meters. But a modern sea dyke ([...]) has a volume of 80.000 cubic meters. If we go on like this the dykes will become too heavy, take too much space or are too costly. They collapse under their own weight.”^{xxv} (Dijken. De Telegraaf. October 23, 2004)

Rotterdam is used as an example of subsidence in this newspaper article. *“One of the deepest polders is the Rotterdamse Alexanderpolder, which lies over seven meters below sea level. This polder has dropped 45 centimeters after construction.”^{xxvi} (Dijken. De Telegraaf. October 23, 2004)* The discussion on implementing new solutions in flood management or keep building flood defenses is still visible in recent years. *“The Netherlands has to protect itself better against the water and that means: new work for construction. The coming 6 years, [...], 180 kilometers dyke should be strengthened across the country.”^{xxvii} (Dijkversterking levert bouw miljoenklus op. Algemeen Dagblad. June 13, 2013)* While another view is given as well,

“To prevent future danger, the Netherlands has to think differently, according to Veerman (old-minister). For centuries, the Netherlands has been guided by ‘strengthening, heightening and closure’. But that does not help on the long term. [...] A search for creative ideas has to be done to solve the problems. Something like the plan for floating houses in floodplains to prevent houses for flooding.”^{xxviii} (Niet bij dijkverhogingen alleen. Algemeen Dagblad. September 17, 2007)

The quotes above reveal a discussion which is going on in the last decade on flood management. There is new thinking about other solutions, which is more focused on vulnerability reduction and bringing in new creative ideas like floating houses. Not one event in the Netherlands can be seen as the start of this discussion, it is more or less a slowly moving shift in flood management towards a combination of hazard reduction and vulnerability reduction. It seems to be a reaction on the insufficient dykes. People in the Netherlands are becoming aware of the fact that flood defenses are not a panacea and that there is a need for new creative solutions.

A lot of different solutions are mentioned and some of the solutions are already implemented, like mounds. *“Mounds are not old-fashioned. Modern mounds are high reclaimed lands, like parts of the Rotterdamse harbor, the Botlek area, the Maasvlakte, the Zeeuwse Sloe area and the port industrial*

area of Delfzijl. Mounds give the ultimate safety.”^{xxxix} Furthermore, it is stated that “Industries know and are not taking risks. If the water dramatically rises, and de dykes collapse, you only get wet feet on the modern mound.”^{xxx} (Dijken. De Telegraaf. October 23, 2004) Mounds sound strange, as it is a solution coming from centuries ago, but it could be a good solution. Another possible solution which can be linked to vulnerability reduction is land maps with safe routes. Thereby, the Netherlands is looking at the United States. “Every Dutch citizen has to have a land map at home and in the car with safe routes in case of a flooding. Secretary of state [...] Schultz van Haegen wants the same type of map used in the evacuation of New Orleans [...].”^{xxxi} (Landkaart in de auto voor overstromingen. De Telegraaf. March 26, 2006) In line with land maps with safe routes are evacuation plans. “The Taskforce (Taskforce Management Overstromingen) thinks that national evacuation planning is essential and they think that in three years a new, big flood drill should be held.”^{xxxii} (Niet voorbereid op overstroming. De Telegraaf. February 6, 2009) As the focus in the Netherlands has always been on hazard reduction which results in a lack of awareness among the population, the country is not known with evacuation plans.

“Big evacuation plans for complete regions in case of extreme floods are not familiar for the Netherlands. Earlier this week, Minister Schultz van Haegen (Infrastructure), advocated for these plans. [...] According to the minister it is also about ‘evacuate to the ceiling’. It is about realizing that a storm can come and that you know what to do, [...].”^{xxxiii} (Watersnoodramp? Vlucht naar zolder! Algemeen Dagblad. January 31, 2013)

Evacuation is one of the points of vulnerability reduction which have to be taken into account in the Netherlands to make people more aware of the risks. Thereby, the Netherlands also takes a look at the United States. The Netherlands takes notice of evacuation planning in the United States. “Schultz van Haegen was impressed by the evacuation plans during her two day visit of the areas hit by hurricanes Katrina and Rita.”^{xxxiv} (Landkaart in de auto voor overstromingen. De Telegraaf. March 26, 2006) Examples of New York City and hurricane Sandy are not there yet, but the Dutch keep learning from hurricane Katrina in New Orleans.

“The chance is small that it happens, but aid workers think about disasters scenario’s seriously since three years. The devastation of New Orleans in 2005 opened the eyes of aid workers in the Netherlands. We don’t talk about a street that is flooded, but big, prolonged disruption, according to Ruurd Reitsma of the Taskforce Management Overstromingen, [...].”^{xxxv} (Denken over de gevolgen ramp is nieuw. Algemeen Dagblad. June 30, 2008)

Besides evacuation, there are a lot of new, creative ideas mentioned in the newspaper articles. Earlier, a quote revealed floating houses, a new way of adjusting buildings to flood risks. Another

option is a whole floating neighborhood. *“You can realize a water neighborhood with floating hotels, shops and businesses. By coupling multiple platforms, buildings of hundreds of square meters floor can be realized.”*^{xxxvi} (Woningbouw op het water. De Telegraaf. September 7, 2002) Rotterdam is working on a transformation of the city by building houses on the water. Till 2025, 5000 houses have to be built on and around the water. *“Besides that, the futuristic city will consist of floating restaurants and attractions (like markets and a park) and watersport facilities.”*^{xxxvii} (Rotterdam bouwt drijvende stad aan oude stadshavens; Vijfduizend woningen. De Telegraaf. May 8, 2008)

Although flood defenses are not sufficient anymore, the idea of hazard reduction should not completely being depreciated. There are other ideas in hazard reduction which has to do with creating more space for the water. *“The coast along big parts of Noord- and Zuid-Holland should be expanded. This is possible by dumping millions of cubic meters sand along the coast, which then spreads on a natural way by wind, waves and currents.”*^{xxxviii} (Miljarden in droge-voetenfonds - Hollandse kust moet stuk breder. Algemeen Dagblad. September 3, 2008) This means going back to past, before 1953, implementing elements of soft infrastructure. Now choices have to be made, as different solutions are suggested in the last decade.

Coming back to the insufficient flood defenses, it becomes clear that the water safety norms are not up to date which results in looking at new creative solutions. But the flood defenses are still there, so something needs to be done with the defenses.

Water safety norms

Loucks et al. (2008) pointed out that the water safety norms in the Netherlands are high, a flood once every 10.000 years. In the United States, a flood can occur once every 100 years. Chances on a flood disaster like 1953, are not big, but it has to be taken into account.

“We can cope with such a storm anno 2013. A storm that will bursts through our dykes is there once every 10.000 years. The chance is small, but it can be there tomorrow. It is like the lottery, small chance, but the price will fall.”^{xxxix} (Watersnoodramp? Vlucht naar zolder! Algemeen Dagblad. January 31, 2013)

Safety norms for flood defenses are not sufficient anymore. Therefore, maintenance is needed. In 2011, it was given that one out of three dykes is not meeting the safety norms. For 2006, this was one out of four dykes, a quarter. *“From an inspection last year, it became clear that of all dykes a quarter does not meet the legal requirements.”*^{xl} (Dijken achter ontoereikende Maeslantkering opgehoogd. Algemeen Dagblad. February 22, 2007) The problems with water safety norms are not

coming from recent years as is stated in a newspaper article. *“If in 1957 in the Deltalaw (Deltawet) is defined how high the dykes should be, why is it not sufficient fifty years later?”^{xli} (Dijken al vijftig jaar lang ondermaats; Deskundigen luiden noodklok: politiek trekt te weinig geld uit voor strijd tegen hoog water. Algemeen Dagblad. October 18, 2006)* Although, the norms are not sufficient to once every 10.000 years, still some people, like Prof. dr. ir. Matthijs Kok, thinks that the norms should be 10 times bigger, a flood once every 100.000 years. *“According to the professor, it would be wise to scale up the probability of failure with a factor ten in the areas with the biggest risks. Than we know for sure that our feet will stay dry.”^{xlii} (Dijken onder de loep. De Telegraaf. December 8, 2012)*

Another way of dealing with the water safety norms is looking into new ways of strengthening dykes or really looking into the dyke to see how dykes can become stronger and can meet the water safety norms in different ways than just heightening dykes.

“At the moment, experiments are done with geotextile, a super strong fiber that holds to the ground. But in the future, most of all, high-tech will be placed in and on the dykes. [...] Sensors in the dykes can connect to satellites and measure shifts of a few millimeters.”^{xliii} (Dijken onder de loep. De Telegraaf. December 8, 2012)

Besides the dykes which protect the Dutch coast, storm surge barriers are important in the Netherlands as well, like the Maeslantkering which has to protect Rotterdam. Storm surge barriers are a whole different way of looking at water safety norms. A storm surge barrier is open and can close when there is a chance on a flood. The system has to work well, which was not the case in 2006. *“Two enormous iron arms should close the canal for high water when a storm is coming from the sea, but it appears that it refuses once out of nine times. According to the safety norms, this should be only once every 1000 times.”^{xliiv}* Apparently, this safety norm cannot be reached, even after reparation. *“From the first research, it appears that the chance on ‘not closure’ of the defense can be lowered to once in 100 times. That is still ten times less safe than was agreed on.”^{xliv} (Maeslantkering hapert te veel; Provincie bang voor overstromingen, dijken Zuid-Holland moeten hoger. Algemeen Dagblad. February 11, 2006)*

Looking at the water safety norms, one does not think of the flood defenses inland, but the flood defenses which protect the country from the sea, the rising sea-level. But flood defenses inland are important as well. Therefore, it is important to cooperate with neighboring countries. Germany has to build up to the same water safety norms as the Netherlands. Otherwise, it will not make any sense to strengthen or heighten dykes.

“In the Netherlands, the dykes in 2015 are calculated at 16.000 cubic meters water drainage per second at Lobith and later even 18.000 cubic meters. There is dialogue, but in Germany it seems to be that for the time being the water drainage does not go beyond 15.000 cubic meters. This can form a threat.”^{xxlvi} (Waterveiligheid verliest prioriteit. De Telegraaf. January 11, 2012)

Both countries need to coordinate with each other to see what the safety norms would be. A big difference between both countries could cause trouble for the Netherlands, as the rivers debouch in the sea here. It comes down to responsibilities. Agreements have to be made with the European Union if both countries cannot come to an agreement.

Overall, the newspaper articles reveal that the focus is still on hazard reduction. It is about strengthening or heightening dykes and new ways of strengthening dykes. But new concepts of dealing with floods are visible as well, introduced because water safety norms are not up to date and dykes cannot be heightened endlessly. With the water safety norms, responsibilities become important as well. This is not only visible between countries, but within the Netherlands as well.

5.3.3 *A lack of awareness vs. responsibilities*

The literature revealed a shift in flood management, whereby new public and private parties are involved in the process of flood management. Furthermore, Meijerink and Dicke (2008) stated that a shift has taken place from flood management as a pure collective good towards the integration of many actors. This shift should have an influence on the public-private divide. Coming back to the water safety norms, multiple actors are involved in the maintenance of dykes. *“At this moment, the water boards manage over 90 per cent of the primary flood defenses in our country. Rijkswaterstaat manages almost 10 per cent. The provinces play the role of supervisor.”^{xxlvii} (Derde van de dijken is niet veilig genoeg. Algemeen Dagblad. November 30, 2011)* Furthermore, there are volunteers who inspect the dykes. *“With storm, high water and heavy rainfall, the water board and the voluntary dyke army come together to come into action to take care of Holland in severe weather conditions as well to keep the land livable.”^{xxlviii} (Hoe houdt Nederland de voeten droog; Creatieve oplossingen beschermen huizen tegen wateroverlast. De Telegraaf. October 27, 2010)* The responsibilities for flood defenses seem to be well divided into a few involved actors.

Although a few actors are involved in the safety of dykes, the flood defenses are not sufficient. People in the Netherlands think they are safe behind the dykes. This is partly due to the flood management tradition. The national government has always been the provider of flood

management, focusing hazard reduction. One of the reasons for a lack of awareness among the population is the communication, already visible in 2002. *“Directors have to coordinate mutual tasks among each other and come to the exchange of information.”*^{xlix} (Zeeland niet klaar voor overstroming. De Telegraaf. October 31, 2002) People need to be better informed, for example in Rotterdam and Dordrecht, who take a look at New Orleans.

“We don’t want to bring panic, but we want to make people alert. Besides that, we want to summon the parties to come together on a short term to discuss with each other everyone’s role, task and responsibility. It could and should not be happening, that now - a year after the disaster in New Orleans by hurricane Katrina - new situations arise, in which the water safety is not well organized.”^l (Overstromingsrisico voor legio woningen. De Telegraaf. November 10, 2006)

People who live in those areas in Rotterdam and Dordrecht are not aware that they are facing risks. People do not know if they are living in an area outside of the dykes. An example is Rotterdam in the ‘Kop van Zuid’, *“Most of the citizens do not know that they live outside of the dykes, according to the water board: in front of a dyke instead of behind.”*^{li} (Overstromingsrisico voor legio woningen. De Telegraaf. November 10, 2006) That people are not aware is due to the fact that the government has not given away information to people living in those areas.

The government has to take responsibility and let people move to other places. *“A lot of places where is built or where space is scarce at the rivers, citizens will know. For people who live at the dyke or in low lying areas this may mean that they have to move.”* (Ruimte voor water. De Telegraaf. March 5, 2005) For people who have to move this means new housing locations have to be found or new strategies have to be created. New strategies were earlier mentioned like floating houses or neighborhoods. These new strategies bring new private actors into the field of flood management. A private actor which always played a role more or less in the background is the insurance company. Since 1953, it is not possible for a Dutch citizen to insure themselves against floods.

“After the flooding in Zeeland in 1953, insurances were shocked by the size of the damage, which was insured then. That was, calculated to the current prices, a price that is comparable with the damage caused by hurricane Katrina, [...]. After that, the flood insurance went under the spell and never came back.”^{lii} (Risico op overstroming is niet langer te negeren. De Telegraaf. July 28, 2011)

Nowadays, citizens have to wait until a flood disaster is declared. *“Now, consumers and companies are designated to a compensation agreement of the government, in case of a flood. A payment is*

thereby not a certainty.”ⁱⁱⁱ (Verplicht verzekerd tegen overstroming. Algemeen Dagblad. January 26, 2013) In a lot of other countries in Europe, flood insurance is mandatory, depending on the place where someone lives. This is not the case for the Netherlands. “The Netherlands is above all the only European country where flood risks cannot be insured.”^{iv} (Rampen dreigen achter de dijken. De Telegraaf. April 21, 2009) Even in 2013, 60 years after the big flood disaster, the Dutch cannot insure themselves against flood damage. But this view has changed. “Now, insurers see it as their duty to insure damage done by floods on houses and belongings because of climate change. Every time a big flood appears people look at insurers. Insurance is our main job, therefore the industry needs to take this, [...]”^v (Verplicht verzekerd tegen overstroming. Algemeen Dagblad. January 26, 2013)

Still, it has been a struggle between insurance companies and the government. The reason why insurers doubt about flood insurance is money. The costs in 1953 were comparable with the costs of hurricane Katrina in New Orleans. That would make the insurance companies bankrupt. “The Bond of Insurers (Verbond van Verzekeraars) wants the government to partially pay such insurance. A flood gives so much damage, according to the insurer, that an insurer alone cannot bear this.”^{vi} (Polis tegen waterramp. De Telegraaf. August 25, 2008) The discussion on insurances will be going on, also in the coming decades unless something is done about it. Maybe, like hurricane Sandy in New York, the Netherlands needs another big flood disaster to give a wake-up call to the population, the government and insurance companies.

In the end, all the problems, living in floodplains, insurances and the lack of awareness has to do with who is responsible for what. According to the newspaper articles, the government should do more about making people aware of the risks for living in floodplains. Also, it should be possible for people to insure themselves against flood damage. This will make people more aware of the risks and will take away the lack of awareness.

5.3.4 The development of the flood management discourse, hazard reduction

Unlike in the United States, the Netherlands has always dealt with flood management, despite of climate change. It has always been a fight against the water, especially after the flood disaster in 1953. This vision is visible in Rotterdam as well,

“The fight against the water is in our dna, says D66-councilar Alexandra van Huffelen (Sustainability). A lot of cities come into action when the damage is already done. We are working on prevention in the Rotterdamse region: how do we avoid wet feet?”^{vii} (Waterpleinen op top deltasteden. De Telegraaf. June 13, 2013)

The quote reveals that the Dutch population will always think about ways of dealing with the water.

2000 can be seen as a turning point, according to the newspaper articles, *“The Netherlands is at a turning point in his relentless fight against the water. For centuries, dykes have been constructed to protect the land against the water. They cannot be heightened endlessly.”*^{lviii} (Hoofdartikel: [Waterbeleid. De Telegraaf. September 1, 2000](#)) Therefore, new ways of dealing with floods have to be implemented. The water needs to get more space.

That the flood management discourse is developing is visible in the last decade. *“The Dutch reputation in the field of water is strong. We do not only score with hard technics like dykes and dams, but also with our soft water knowledge [...]. The fight against the water is slowly turning into working with the water.”*^{lix} (Nederlandse watersector scoort via blauwe loper. [De Telegraaf. November 1, 2011](#)) The view has changed from fighting against the water towards living with the water and living with nature. It is actually going back to past. *“[...] ‘building with nature’ roots in the past and points at the future - [...]. In phases we recover the historical coastline from the beginning of the Golden Age. And with nature as most important component, the method is focused on sustainability.”*^{lx} (Herstel van kust is beter dan aanleg eiland in Noordzee. [Algemeen Dagblad. November 17, 2007](#))

The change brings new creative ideas to flood management. *“The polder is becoming a neighborhood as well as storage for water. The water is knowingly leaded to the polder, [...]. In fact, it can easily be 30 centimeters more. The floating houses can go upwards with the water.”*^{lxi} ([Drijvende woonwijk in onder water gazette polder. Algemeen Dagblad. June 20, 2008](#)) Another concept is the ‘tides economy’ created by an engineering company in cooperation with the university of Eindhoven and the university of Nijmegen, *“[...] an innovative concept whereby the idea of living with the sea is central: [...]”*^{lxii} It is stated that, *“By making use of the power of the water without bringing the safety of citizens and users into risk. The tide gives opportunities for living, working, recreation, agriculture, nature, safety and multiple land use, [...]”*^{lxiii} ([Getijdeneconomie geeft de Zeeuwse delta flinke impuls. De Telegraaf. January 15, 2009](#)) The tidal economy gives a whole new insight in how to deal with floods.

Still, Rotterdam thinks about concepts of fighting the water as well. They talk about a dyke which looks like stairs. *“The city has beautiful plans for the so called stairs dyke, whereby there is the possibility of houses at one of the levels of the stairs, or a parking lot for cars.”*^{lxiv} ([Wonen op een klimaatdijk; Nieuwe waterkering tegen stijgende zeespiegel. De Telegraaf. July 8, 2009](#)) Thinking of

new types of dykes, there is the concept of the deltadyke, as the dyke should not be an object which prevents floods, but it should be used for multiple purposes.

“The sea-level is rising and the discharge of water from the river is increasing. [...] the dykes have to be improved in the coming years with a factor ten. Veerman (of the commission Veerman) sees a Delta dyke: a high, wide, strong dyke in which an uncontrollable flood will be almost nil. Short after the term climate dyke was born: a general term (the terms mound dyke and super dyke are also there) for a strong water defense which will bring years of safety.”^{xv}

(Wonen op een klimaatdijk; Nieuwe waterkering tegen stijgende zeespiegel. De Telegraaf. July 8, 2009)

To conclude, judging from the newspaper articles, a lot is going on in the flood management discourse of Rotterdam. The image that is created by the mass media of the flood management discourse is a city and also a country that deals with flood management for over decades. One disaster is mentioned in more specific in the newspaper articles, the big flood disaster in 1953. 1953 can be seen as a window of opportunity, to rethink flood management. From that year on, flood management has always been an important aspect, focused on hard infrastructure. Now, the newspaper articles reveal that a shift is taking place, back to the past, towards soft infrastructure. But Rotterdam is also looking into new measures which have to do with vulnerability reduction, like a stairs dyke or floating houses.

Before the big flood disaster, the flood management discourse focused on hazard reduction with the implementation of soft infrastructure. With the flood disaster in 1953, a shift has taken place within hazard reduction towards hard infrastructure, carried out by the national government as it is a matter of national security. A flood like that could never happen again. Besides that, half of the country lies below sea-level or deals with flood risks. Climate change and urbanization has made flood management even more important for the Netherlands. Now in the last decade a slow shift is visible towards the implementation of new creative solutions. This is likely due to the debate on climate change. Climate change asks for new ways of thinking about flood management. Dykes cannot be heightened endlessly. Revealed by the newspaper articles, it is a shift from fighting against the water towards living with the water and working with nature, implementing soft infrastructure and new types of dykes. It is a shift going back to the past. The focus remains on hazard reduction, even though new concepts and ideas are suggested of evacuation plans or early warning systems.

Next to the implementation of new concepts, it is important to think of responsibilities. The national government has always taken care of flood management which causes a lack of awareness among the population. As the literature revealed a shift towards the integration of many actors, still a few actors seem to be involved according to the newspaper articles. Furthermore, the newspaper articles reveal that communication needs to be better between governments as well as with the population, but there is nothing said about the involvement of new public and private actors. On the other hand, insurance companies are widely discussed over the last decade as people in the Netherlands cannot insure themselves against floods damage.

Looking at the discourse structuration in newspaper articles, there is not one clear window of opportunity visible. Unlike in the United States, the Netherlands does not have to deal with for example hurricanes. The last big flood disaster at the coast was in 1953 and at the rivers in 1993 and 1995. Still, flood management is developing, likely influenced by climate change and the water safety norms. Thinking of the development of the flood management discourse in newspaper articles, it becomes clear that the focus in Rotterdam remains on hazard reduction, but a shift is taking place within hazard reduction, from flood defenses towards soft infrastructure and new types of dykes which give space to more functions.

5.4 Discourse institutionalization, the role of the government

A shift is visible in the flood management discourse of Rotterdam, according to the language used in newspaper articles. The discourse develops over time. The focus still seems to be on hazard reduction, but a shift is visible within hazard reduction. Back to the past, focusing on soft infrastructure. There is also a shift visible towards the implementation of measures which have to do with vulnerability reduction, like floating houses and neighborhoods. Besides the influence on the newspaper articles, the flood management tradition also influences the policy field of flood management.

The newspaper analysis revealed that there is not one clear window of opportunity which results in a shift in flood management, except for the big flood disaster in 1953 and the flooded rivers in 1993 and 1995. Still, a shift is visible in the newspaper articles. The policy field analysis will show if there is a shift visible, besides the window of opportunity, in the policy field. In other words, has the language in the newspaper articles been solidified into institutions, in the institutional context, in policy documents and in the responsibilities of actors. This section refers to step 3, explained in the conceptual framework. First, an institutional context will be given which provides information about who is involved in the process of flood management. From there I will move on to the different

elements which are relevant in looking at the development of flood management discourse, the perceptions on climate change, the measures taken in the protection against floods and the public-private divide, the involvement of actors.

5.4.1 *The institutional context*

Flood management in the Netherlands is seen as a common or a public good, revealed earlier in the flood management tradition. As the coming quote reveals as well,

“While his country has invested heavily in flood control, Mr. Kuijken, the delta commissioner, says this does not mean idly throwing around money but instead involves a careful cost-benefit calculation. The Dutch government currently spends around \$1.3 billion a year on water control, and local water boards spend hundreds of millions more to maintain dikes and canals, kill muskrats and pump water from the ‘polderland’ - [...].”(Lessons for U.S. from a flood-prone land. The New York Times. November 15, 2012)

What is striking in flood management in the Netherlands is the special position of the Delta commission, next to the national government. The Delta commission is established in September 2007. The goal of the commission was to give an advice to the government in September 2008 on water safety on the long-term, thinking of the effects of climate change. One of the advices was creating a Delta law (Deltawet). The advice was incorporated in a national plan called Nationaal Waterplan. The Ministry of Transport and Water (Ministerie van Verkeer en Waterstaat), since 2011 the Ministry of Infrastructure and Milieu (Ministerie van Infrastructuur en Milieu) elaborated the advice. The Delta law is there since January 1, 2012, which makes the Delta program (Deltaprogramma), the Delta fund (Deltafonds) and the Delta commissioner (deltacommissaris) legal, and gives the delta commissioner a unique position (Deltacommissie, n.d.).

The Delta law regulates that a Delta program has to be made to protect the country from high water. The Delta commissioner takes care of the implementation of the program, Deltaprogramma 2013 (Deltacommissie, n.d.). The Deltaprogramma 2013 is divided into nine subprograms, to get a better understanding of the different areas in the Netherlands. The nine subprograms are Veiligheid (Safety), Nieuwbouw and Herstructurering (Construction and Restructuring), Zoet Water (Fresh Water), Kust (Coast), Rivieren (Rivers), Rijnmond-Drechtsteden, Waddengebied (Wadden Area), IJsselmeergebied (IJssellake area) and Zuidwestelijke Delta. The Delta program should be used as a guideline for the twelve provinces in the Netherlands, for this thesis this will be the province of Zuid-Holland. The province translates the goals and measures into regional policy. Local governments can play a role as well.

The Water law (Waterwet) provides information about who is responsible. The national government is responsible for the primary flood defenses. These defenses have to keep the water out, coming from the North-Sea and from the large rivers, the Rijn, the Schelde, the Eems and the Maas. Furthermore, the government is responsible for the water safety norms. Provinces are responsible for the secondary flood defenses. The secondary flood defenses protect the Netherlands from water inlands, which is controllable. Municipalities are responsible for tasks like ground water in urban areas and the discharge of wastewater and storm water. Furthermore, there are water boards who are responsible for managing the water and taking a look at the water quality (Rijkswaterstaat, 2013).

It becomes clear that flood management in the Netherlands is well organized on all different government scales. It is also visible that the focus is on prevention, hazard reduction. Three documents are interesting to look at in the policy field of flood management for Rotterdam, the Deltaprogramma 2013 which provides guidelines for provinces, the regional program called Provinciaal Waterplan Zuid-Holland 2010-2015 and the local program of the municipality of Rotterdam in cooperation with the water boards of Hollandse Delta, Schieland Krimpenerwaard and Delfland, to protect the city from floods. The plan is called Waterplan 2007-2012 and focusses on projects relevant for Rotterdam and her surrounding areas.

5.4.2 Recognizing the effects of climate change

The newspaper analysis has revealed that the view on climate change differs, climate change as the cause for the rising sea-level and climate extremes on the one hand and human activities influencing climate and therefore the people are responsible for a rising sea-level and climate extremes on the other hand. Despite of climate change, the Netherlands deals with flood risks.

Climate change is mentioned a few times in the Deltaprogramma 2013. Floods, drought and heat are due to the combination of the effects of climate change and urbanization. Effects of climate change that have to be taken into account according to the program are a rising sea-level and an increase of rainfall. The effects of climate change and the socio-economic developments, like urbanization, are used to create four possible future scenarios for the Netherlands, which will be implemented in the subprograms of the Deltaprogramma 2013 (Rijkswaterstaat, 2013).

The province as well recognizes the effects of climate change in the Netherlands, as the coming quote reveals.

“The coming decades we have to deal with major new challenges. Climate change, increasing salinization and changes in the landscape ask for adaptations in water management. That climate change continues, does almost doubt no one anymore. The exact effects cannot be overlooked yet. But it is clear that the sea-level is rising and the weather is more extreme.”^{xvi}

(Provincie Zuid-Holland 2009, p. 9)

The plan also recognizes the effects for the province. Zuid-Holland is a low lying area in the delta. It has a high population, there are a lot of buildings, houses and companies and the economic value is high which makes the province vulnerable towards climate change. As well as the delta program, the province states that it is about a combination of the effects of climate change and the increasing pressure on the landscape and that is why it has to be taken into account thinking of flood management (Provincie Zuid-Holland, 2009).

Waterplan 2 2007-2012 agrees and states that there is a lot of attention for climate change, a rising sea-level, subsidence, building in polders, the reason for the right water quality, water safety and flooding in the media.

“Not one day goes by without predictions on climate developments, presented to us via the media. Water is one of the most important themes. It is clear that we have to cope with more and more water in the coming decades. And the water is coming, for Rotterdam, literally from four sides; from the sea, the rivers, the air and out of the ground. The water problem is already urgent and becomes even bigger. The effects of climate changes are already visible.”^{xvii} (Gemeente Rotterdam 2007, p. 32)

In the programs it is visible that the combination of the effects of climate change and urbanization are pressuring on the landscape which causes floods, drought and heat. Waterplan 2 explains that water is coming from four sides in Rotterdam and therefore the water problem is urgent. But, climate change has not been the reason to carry out policy. The Netherlands has always had a focus on flood management and climate change just made that focus even stronger. To deal with the effects of climate change and urbanization, different measures are taken.

5.4.3 Multi-layer safety

According to the literature as well as the newspaper articles, the flood management discourse of Rotterdam focusses on hazard reduction, by building flood defenses. This view has shifted towards the implementation of soft infrastructure, making more space for the water and working with

nature. Besides the soft infrastructure, a discussion was visible on implementing new creative ideas, like delta dykes and floating houses which can be linked to vulnerability reduction.

An overall research is done on multi-layer safety in the Netherlands. Multi-layer safety consists of three layers:

- Layer 1: prevention, avoid floods with preventive measures
- Layer 2: protection, limit causes of floods with spatial planning
- Layer 3: preparedness, limit causes of floods with disaster management

With multi-layer safety, the Netherlands is thinking of the implementation of new ways in flood management, instead of only focusing on hazard reduction (layer 1). Regional and local governments have to do research on the implementation of multi-layer safety. The focus still seems to be on hazard reduction when taking a closer look into the Delta program. One of the most important issues is the water safety norms. These are not sufficient anymore, as was visible in the newspaper articles as well. 1225 kilometers of flood defenses were not sufficient, which has to be worked on. Furthermore, research is done on new types of dykes. An example is given of a 'Delta dyke'. In extreme circumstances, some water can flow over the dyke. The flow of the water is controllable. Other terms used are climate dyke or super dyke. Spatial planning is important as well, by making more space for the water or making buildings and infrastructure capable of dealing with floods, making the city climate proof. Besides that, vital and vulnerable functions, like hospitals, need special attention (Rijkswaterstaat, 2013).

To go into more specific on Rotterdam, the area has to deal with subsidence on top of the effects of climate change and urbanization, which causes lowering of the dykes and thereby the decline of the effectiveness of the dykes. The dykes are located in an area where there is no space left to build new dykes. Furthermore, the area inside of the dykes has a cultural-historic value. Five strategies have been developed in the Delta program, which have to be investigated. The five strategies are, water safety can be increased by strengthening the dykes, change the spread of the river discharge or store water somewhere else, coping with high river discharges and a high sea-level by fixed or movable barriers, reducing the effect of a flood by a change in spatial planning or an improvement of disaster management. Besides the dykes, research has to be done on storm surge barriers, especially the Maeslantkering. Next to that, the coast needs special attention as coastal cities are important economically. Soft infrastructure where possible and hard infrastructure where it is needed ('zacht waar het kan, hard waar het moet') (Rijkswaterstaat, 2013).

The province of Zuid-Holland also seems to focus on hazard reduction as well as the Delta program. The regional government distinguishes four elements in water safety which will be important in the policy:

- Strengthening the primary flood defenses, involving the defenses at the coast as well as the defenses along the rivers.
- Strengthening the regional water defenses, this involves the defenses of the bosom.
- Protection of the vulnerable areas, spatial planning has to be used for the areas outside of the dykes and the areas inside the dykes with higher risks.
- Crisis management and emergency care, the province has to be prepared to floods and respond adequately on the crisis which follows.

Already, multi-layer safety is visible, as mentioned in the Delta program. Measures mentioned in the regional plan are reinforcements in the flood defenses (primary and secondary flood defenses), risk zoning, spatial planning for vital functions, disaster management and innovative projects will be investigated. An example of an innovative project is 'Zandmotor' (Provincie Zuid-Holland, 2009). The Zandmotor is an initiative of Rijkswaterstaat and the province of Zuid-Holland. In 2011, sand is moved 10 kilometers from the coastline of the Netherlands. The nature will take care of the rest in protecting the coast line. The sand will be moved by the wind, the waves and the stream of the sea along the coast. New beaches and dunes are formed which helps to protect the Netherlands against a rising sea-level and gives more space to recreation and nature. This is the so called soft infrastructure (Rijkswaterstaat, n.d.b).

The local government, who takes care of Waterplan 2, looks at the national and regional program and uses the programs as a guideline for the protection of Rotterdam against floods. Rotterdam should be a place where people could live with the water, work and recreate. Besides the focus on strengthening the dykes and upgrading the dykes to the water safety norms, Rotterdam is looking at new possibilities, for example building outside of the dykes. One of the new concepts mentioned is floating houses. Other measures are making evacuation plans and increasing the communication between the citizens and the municipality of Rotterdam (Gemeente Rotterdam, 2007).

Like the literature and the newspaper articles reveal, the focus is still on hazard reduction. Within hazard reduction a change is visible. Besides looking at strengthening and heightening dykes, the country, the province and Rotterdam are looking into the implementation of soft infrastructure. Also the implementation of multi-layer safety is visible in the regional and local program, with making buildings and houses capable of dealing with floods and creating evacuation plans. Furthermore,

more research is done on new concepts for example the delta dyke, which was mentioned as well in the newspaper articles.

5.4.4 *The involvement of public and private actors*

The institutional context has revealed that the government plays an important role in flood management, the national, the regional as well as the local government. The governments are cooperating well together. Still flood defenses are not sufficient, stated in the newspaper articles as well as in the programs in the policy field. Therefore, cooperation and communication needs to be better. According to the Deltaprogramma 2013, the cooperation between the government and regional and local governments needs to be used fully. In 2014, decisions will be made for water management in the future, called 'Deltabeslissingen'. All actors involved in the process have to be involved in the decisions. In recent years, the cooperation between the public and private actors has been intensified, which also shows that the shift in flood management towards a holistic view, where more stakeholders are involved, is visible in the policy of the Netherlands. Besides all the stakeholders, the population is important as well. Organizations, companies and citizens do have to have the possibility to bring in new ideas, strategies and measures which can be used in flood management (Rijkswaterstaat, 2013).

The regional program, Provinciaal Waterplan Zuid-Holland 2010-2015, reveals that different actors are involved as well. Still, the most important actors are the national government, the regional government and water boards, who focus on the flood defenses. Other initiatives, like the Zandmotor, do involve new private actors (Provincie Zuid-Holland, 2009).

Waterplan 2 2007-2012 is a plan made on the local level by the municipality of Rotterdam and the water boards of Hollandse Delta, Schieland Krimpenerwaard and of Delfland. It already included many actors by making the plan. For the projects which have been implemented and going to be implemented, different actors are involved as well. An example is project Zuiderpark, which led to more space for the water, but it also became an attractive place for recreation. Individuals also refer to the cooperation between different actors.

"The ambition to make the cooperation between government services better, as well as intensify the ties with project developers, housing corporations and water boards, speaks to Brakman in Waterplan 2 Rotterdam. [...]. Only in a joint effort you can stay above the water. That is the lesson [...] I have learned."^{xviii} (Gemeente Rotterdam 2007, p. 55)

Brakman had to cope with flooding in his hair salon and realized that cooperation between different actors is important. This is visible in Waterplan 2. The municipality of Rotterdam wants to intensify the cooperation between actors in the so called coalition projects and more actors are needed because of the urgency of the water problems for the coming decades.

“The water challenge and the urban challenge are influencing each other. It is about the so called coalition projects. A significant water challenge can lead to a program with a living environment with lots of water and places of restructuring are especially suitable for adjustments in the water system.”^{lxix} (Gemeente Rotterdam 2007, p. 81)

The shift towards the integration of many actors is visible in the policy field on flood management in Rotterdam, although the governments are still the biggest providers of the good. This is also due to the focus on hazard reduction. The programs do not include the role of private insurance companies, as this was a big discussion in the newspaper articles.

5.4.5 Hazard reduction, the flood management discourse

What is commonly accepted in language, seen in the newspaper articles, and what has solidified into institutions, is the focus on hazard reduction in the flood management discourse. Thereby, it can be said that hazard reduction is the dominant flood management discourse, looking at the discourse structuration as well as the discourse institutionalization.

The policy field analysis has revealed that Rotterdam still focusses on hazard reduction, as was visible in the flood management tradition as well as the newspaper articles. The main focus is on updating the flood defenses. Still, there is a shift visible within hazard reduction, from hard infrastructure to soft infrastructure. Hereby, Rotterdam goes back to the past, before 1953 where the focus was already on soft infrastructure. Furthermore, Rotterdam is hinting at vulnerability reduction, visible in the multi-layer safety as well, by looking at floating houses and neighborhoods or a stairs dyke. *“The Delta program will give attention to the concept of multi-layer safety and with that besides prevention work on limiting the effects of a flood by better spatial planning and adequate disaster management.”^{lxx} (Rijkswaterstaat 2013, p.11)* It is a shift from fighting against water towards living with water and working with nature, *“With a new look: based on the opportunities that water offers, instead of a focus on the problems water gives.”* (Gemeente Rotterdam 2007, p. 135)

With the Deltaprogramma 2013, Provinciaal Waterplan Zuid-Holland 2010-2015 and Waterplan 2 2007-2012, the Netherlands is well organized when it comes to flood management. It is also revealed

that the governments want to cooperate with all the relevant public and private actors, to come to new insights. Furthermore, the population needs to be involved and think of new ideas dealing with floods.

Overall, the flood management discourse, derived from the policy field is still focused on hazard reduction, especially building and maintaining flood defenses. But Rotterdam is taking a look at new ways of dealing with floods as well, still focused on hazard reduction, but with the implementation of soft infrastructure and making more space for the water. Also the implementation of multi-layer safety reveals that Rotterdam is thinking outside of the box, not only hazard reduction but also vulnerability reduction. Furthermore, all the programs, from national to local, reveal that it is important to cooperate and communicate with each other to come to better and new ideas in flood management.

5.5 Reflection

In this thesis, a secondary literature research, a newspaper analysis and a policy field analysis were conducted of how the flood management discourse has been developed in Rotterdam and what kind of events have had an impact on the development. Hazard reduction can be seen as the dominant flood management discourse in Rotterdam. The ideas and concepts commonly accepted in Rotterdam are focused on hard infrastructure, the implementation and maintenance of flood defenses. These ideas and concepts are also solidified into institutions, visible in Deltaprogramma 2013, Provinciaal Waterplan Zuid-Holland 2010-2015 and Waterplan 2 2007-2012. But the dominant discourse seems to change, as Rotterdam is looking more into new creative solutions linked vulnerability reduction. Furthermore a shift within hazard reduction is visible towards soft infrastructure.

The results of the secondary literature research, the newspaper analysis and the policy field analysis revealed that the flood management tradition shows a focus on hazard reduction. This is visible as well in the newspaper articles and in the policy field. There have only been events in the past which have had an impact on the flood management tradition as well as the flood management discourse now. The big flood disaster in 1953 resulted in a shift within hazard reduction from soft infrastructure to hard infrastructure, as a disaster like that could never happen again. The flood defenses are not up to date anymore and the effects of climate change in combination with urbanization are getting more important, which can be seen as the window of opportunity for the Netherlands. Rotterdam is taking a look at measures which can be linked to vulnerability reduction as

well as new measures which can be linked to hazard reduction. This is visible in both the newspaper articles as well as the policy field.

Thinking of the public and private actors, it seems that more private actors are getting involved in the process of flood management, looking at the local government, Waterplan 2 2007-2012. Still, the government plays an important role in flood management. But, it is made clear that cooperation and communication will become better, as the population needs to have the possibility to have something to say about flood management. The flood management tradition as well as the newspaper analysis revealed some struggles in flood management, for example outdated water safety norms. In the policy field analysis it became clear that flood defenses are going to be made up to date. Another struggle was the responsibilities which especially have to do with the insurances. The insurances are conducted by private actors and are therefore not revealed in the policy field, but the newspaper articles made clear that insurance companies want to cooperate with public actors. A solutions needs to be found on this issue, as it is important that people have the possibility of getting insurance against flood damage.

Reflecting on the theory about the shift in flood management, it can be said that the shift is partly visible in the newspaper analysis and the policy field analysis of flood management in Rotterdam. Rotterdam still seems to focus on hazard reduction, but the city also tries to implement new measures in flood management linked to hazard reduction as well as vulnerability reduction. In the theory, the concept of resilience is mentioned, which could be linked to hazard reduction, vulnerability reduction and exposure reduction. This concept is not mentioned at all in the newspaper articles as well as in the policy field. Looking further at the shift in flood management, it is visible in both the newspaper articles as well as the policy field that new private actors are getting involved when it comes to the implementation of new creative ideas, like the deltadyke. Furthermore, Rotterdam tries to involve the population more in the process of flood management.

The last chapter will compare New York and Rotterdam with each other. The chapter will give conclusions and recommendations and will give an answer to the main question. Furthermore, the chapter will provide a reflection on the theoretical and methodological part of the thesis. Chapter 6 can be linked to step 4 in the conceptual framework.

Chapter 6: Conclusion & recommendations

6.1 Introduction

The thesis has revealed that various flood management discourses are visible between countries, influenced by culture. Furthermore, it is revealed that events like hurricanes or a big flood disaster can have an impact on the debate and discussion which is going on in flood management, especially visible in the newspaper articles. These events can be seen as windows of opportunities, a way to rethink flood management. The policy field analysis of both cities already revealed new concepts introduced in flood management, but it also shows that the discourse on flood management is stable as countries mostly stick to what they know, what they are familiar with. This chapter will provide an empirical reflection whereby both countries will be compared to each other, step 4 of the conceptual framework, which will give an answer to the research question:

- Comparing New York and Rotterdam, what is the influence of culture and events related with floods on how the flood management discourse has been developed, looking at the perceptions on climate change, measures taken in flood management and the public-private divide?

Besides that a theoretical reflection as well as a methodological reflection will be given. In the end recommendations will be given for further research.

6.2 Comparing New York and Rotterdam

New York and Rotterdam are both very similar cities, but at the same time there are differences. Looking at the similarities, major interests are at stake, for example the economy, New York has Wall Street and Rotterdam has an important harbor. Furthermore, both cities are urban coastal cities. But there are also differences, looking at the sense of urgency, the geography and the flood management tradition. New York deals with hurricanes, while Netherlands had to deal with one big flood disaster in 1953 and flooding of the river in 1993 and 1995. There is also a difference in geography. New York is lying above sea-level, Rotterdam is lying below sea-level. Furthermore, the Netherlands is a much smaller country than the United States. Another difference is the difference in the flood management tradition. New York seems to focus on vulnerability reduction and Rotterdam seems to focus on hazard reduction. The similarities as well as the differences between the urban coastal cities make it interesting to compare. New York and Rotterdam will be compared using the steps described in the conceptual framework in chapter 2, referring to the flood management tradition, the flood management discourse in newspaper articles and the dominant flood management discourse in the policy field.

Flood management tradition

The first step was defining the flood management tradition of New York and Rotterdam. Culture has an influence on the way flood management is conducted. In the past, flood management in the United States was focused on scientific research. It was important to collect information and data on natural disasters shortly after their occurrence. A disaster could help to think about dealing with floods, but the opposite has happened. Once the disaster passed by, little effort was made to look into the information and data collected. The government seemed to have a lack of interest for doing more research. The flood management tradition ended up in creating models to predict hurricanes. This is still visible, looking into New York. The focus is on vulnerability reduction. Also geography has an influence on the focus on vulnerability reduction. The United States is a country which has to deal with many natural disasters, floods are just a part of these natural disasters. Evacuation plans are used for all natural disasters, while implementing dykes is only relevant for dealing with floods.

This is different in Rotterdam. Flood management has always focused on hazard reduction. In the past, hazard reduction could be referred to soft infrastructure, working with nature and living with the water. This changed in 1953, after the big flood disaster. According to the government, something needed to be changed. People were not well protected against floods. This led to the implementation of flood defenses all over the Netherlands, the focus had shifted to hard infrastructure. This is also visible in Rotterdam, where the storm surge barrier 'the Maeslantkering' is built to protect Rotterdam from flooding.

Discourse structuration, the flood management discourse in newspaper articles

The second step in the conceptual framework refers the use of language in newspaper articles, done with a newspaper analysis. To define the development of the flood management discourse in New York and Rotterdam, three elements have been used to describe the development. The three elements are the perceptions on climate change, as the effects of climate change likely influence the amount floods, the measures taken in flood management, with a closer look at the water safety norms and the public-private divide, the involvement of actors.

For a long time, the United States has been skeptical about climate change. The same is true for New York. This view has changed over time. If climate change is the cause or not for a rising sea-level and the increase of climate extremes, the newspaper articles reveal that it has to be taken into account as something needs to be done with a rising sea-level and the increase of climate extremes. Looking at the measures taken in flood management, New York still seems to focus on vulnerability reduction as making flood maps up to date and adjusting buildings and infrastructure to flood risks. But, a shift

is also visible, whereby hurricanes can be seen as the window of opportunity. Hurricane Sandy for example, starts a debate on the implementation of hazard reduction and making flood maps up to date. The shift in the public-private divide, according to the literature, is not visible in the newspaper articles as public as well as private actors are already involved in flood management. But what is visible is the role of insurance companies. Insurances seem to be a big problem in New York. Flood maps are not up to date, people cannot get insured against floods and also people keep rebuilding in floodplains. There has not been a solution yet how to solve this problem.

The Dutch newspaper articles reveal the debate on climate change in the last decade. Flood management has always been important in the Netherlands, but climate change in combination with urbanization makes it even more important. The effects of climate change as well as water safety norms influence the discussion on the measures taken in flood management. The newspaper articles show that the focus is still on hazard reduction, but because of insufficient flood defenses and the rising sea-level, a change is visible in Rotterdam towards soft infrastructure and vulnerability reduction, by making more space for the water, creating evacuation plans and making buildings and infrastructure capable of dealing with floods. A shift in the public-private divide cannot be seen in the newspaper articles. The role of the government is still very important in flood management. Like in New York, the role of insurances is also a striking point in Rotterdam as people cannot be insured against flood damage since 1953.

Discourse institutionalization, the dominant flood management discourse

The third step in the conceptual framework refers to discourse institutionalization. It reveals if the language used in the newspaper articles is also visible in the policy field of flood management and can thereby a dominant flood management discourse be revealed for New York as well as Rotterdam. The three elements described above, the perceptions on climate change, the measures taken in flood management and the public-private divide are also used in the policy field analysis.

The policy field analysis of New York has revealed that the effects of climate change, a rising sea-level and the increase of climate extremes, have to be taken into account in flood management. Furthermore, the measures in flood management still focus on vulnerability reduction. Flood maps are made up to date, building codes are created and evacuation plans are made. Besides that, New York is doing research on new ways of dealing with floods related to hazard reduction. Thereby, New York is looking at a city like Rotterdam to see how different the city deals with flood risks. Looking at the public-private divide, the involved actors and the institutional context, it is visible that the federal government plays an important role when it comes to disaster management, evacuation plans,

making flood maps, but besides that it is up to the local government and private actors to do research on new ways of dealing with floods. Communication and cooperation between actors is getting more important as well as the involvement of the population. It can be said that the dominant flood management discourse in New York is vulnerability reduction with the involvement of public and private actors. The shift that seems to take place can be seen as a shift in the language used, but these ideas and concepts are not part of policy field yet, only research is done.

The policy field analysis of Rotterdam shows that flood management has always been important in the country, but the effects of climate change have made it even more important. It pushes the city to make flood defenses sufficient and looking at new creative solutions. Still, the focus is on hazard reduction, although research is done on floating houses, different types of dykes and evacuation plans. The government plays the most important role in flood management, but when looking into the program of Rotterdam it is also visible that a lot of private actors are getting involved in flood management. Thereby, the cooperation and communication between actors is important. Also the population has to be involved. For Rotterdam, it can be said that the dominant flood management discourse is hazard reduction with an important role for the government, but private actors are involved as well. For Rotterdam it can also be stated that the shift that seems to take place can be seen as a shift in the language used, but the ideas and concepts are not part of the policy field yet, only research is done on these ideas and concepts.

In the end, for both New York and Rotterdam, the shift revealed in the theory is revealed as a shift in language in the case studies. The cities want to change, but this is not yet visible in practice, by looking at the policy documents and the institutional context. The following section will give two similarities as well as two differences between New York and Rotterdam in the flood management discourse.

6.2.1 Similarities and differences

The similarities and differences are part of step 4. Earlier, it is already stated that New York and Rotterdam are two similar cities as well as different cities which makes it interesting to compare both urban coastal cities with each other. In the flood management discourse there are also similarities as well as differences between New York and Rotterdam.

Similarities

One of the most striking comparisons which can be made between New York and Rotterdam is the insurances. In both cities, insurances are part of one of the biggest debates in flood management.

The debate on insurances can be explained by the role of the government and the insurance companies. For both, New York and Rotterdam, the national government has to declare a disaster before any money can be released to people who are hit by a disaster. Most of the times, the money comes too late or there is not enough money. Also the role of the insurance companies is important. In both cities, people cannot be insured for flood damage. In Netherlands, since 1953 insurance companies do not want to insure people for flood damage as it is too expensive. Also in the United States, insurance companies think that it is too expensive to get people insured for flood damage. A solution which is given for New York as well as for Rotterdam is the cooperation between the government and insurance companies.

Another similarity between New York and Rotterdam are the water safety norms. In New York this refers to flood maps, in Rotterdam this refers to flood defenses, most of all the Maeslantkering. It seems that both cities are well protected. A flood can occur once every 100 years in New York and once every 10.000 years in Rotterdam. But, in both cities the water safety norms are not up to date based on old data. In New York the flood maps were based on data from 30 years, in Rotterdam the flood defenses were based on data from 60 years ago. The policy field analysis for New York and Rotterdam reveal that the cities want to do something about these water safety norms, to make them up to date again.

Differences

Besides the differences between the cities, looking at the sense of urgency and the geography, the flood management tradition is one of the biggest differences. New York is mainly focusing on vulnerability reduction. The United States is also seen as leading in disaster management. New York focusses on making evacuation plans, making flood maps up to date and adjusting buildings and infrastructure to building codes. Rotterdam is mainly focusing on hazard reduction. Thereby, the Dutch are seen as the masters of coastal engineering, by building dykes and storm surge barriers. An example for Rotterdam is the Maeslantkering, a storm surge barrier which can close when there is a chance on a flood. These differences between New York and Rotterdam can be explained with the flood management tradition.

Another difference between New York and Rotterdam is the role of the national government. This is also due to the flood management tradition. New York is a country which has to deal with more than just floods, it also deals with other natural disasters. It is impossible to make policy for every different natural disaster. Therefore, the federal government takes care of disaster management which focusses on all natural disasters. Evacuation plans are made which can be used for any disaster that

has taken place. Other aspects which have to do with flood management are organized on the local level. In Rotterdam, the national government plays an important role in flood management. The national government sets guidelines for provinces and cities to carry out flood management.

6.2.2 Learning lessons

New York and Rotterdam can learn from each other as both cities have a different flood management discourse. New York can look at Rotterdam if the city wants to implement flood defenses, the other way around Rotterdam can look at New York if the city wants to implement evacuation plans. In that, case both cities can learn from each, although other aspects have to be taken in mind as well. Another flood management discourse cannot simply be copied by another city, because of the influence of culture and also the geography. As the Netherlands is a small country, it not hard for the national government to take care of flood defenses along the coast. But the United States is a big country and the national government cannot be responsible for everything.

That another city or country cannot simply be copied or replicated is visible in the literature as well as in the newspaper articles. One solution can have different outcomes between flood management discourses. But this has not to say that urban coastal cities cannot learn from each other. New York and Rotterdam can look at each other and adapt ideas and concepts to their own situations.

Also with the similarities, New York and Rotterdam can help each and learn from each other. In both cities it became clear that insurances are a hot topic. Both cities can discuss with each other on this topic in adapt ideas to their own situation which has to do with the insurances. The same is true for the water safety norms. In the end, New York and Rotterdam can be better protected and prepared for floods if the cities cooperate with each other and learn from each other by exchanging knowledge and share practices, this already happens with Connecting Delta Cities which both cities are part of.

6.3 Theoretical and methodological reflection

In the previous sections, the empirical data is summarized and the case studies New York and Rotterdam were compared. In the theoretical background it is made clear that flood management in a country or city is influenced by culture, which results in a flood management tradition. Culture is influenced by a shared history, language and beliefs, which will become visible in the institutions, like governments and organizations. Eventually, cultural differences lead to various flood management traditions. A way to identify these cultural differences is by discourse, in this thesis the flood management discourse. Discourse makes sense of phenomena, flood management can be understood. But it can be understood differently between countries and cities. A flood management

discourse will become dominant if it is commonly accepted by people, but it also has to be solidified into institutions, like the government, laws or policy documents. Thereby, events, like hurricanes can influence the dominant discourse. This is also argued by Hajer (2006), discourse is produced and reproduced in an identifiable set of practices. Apart from various flood management discourses, a shift has taken place in flood management from a technical approach to a holistic approach. This means a shift in the measures taken in flood management as well as a shift in the public-private divide, the involved actors.

The theory revealed that the flood management discourse is influenced by culture. This can be seen in the empirical data. Especially, history can have a huge impact on the flood management tradition. Furthermore, this research has focused on the development of the flood management discourse of New York and Rotterdam, by looking at the shift that has taken place in flood management. The shift that is revealed in the theory is just partly visible in the case studies. The case studies reveal that the shift in flood management is more a shift in language instead of also a shift in practice. This is different than the theory has revealed. To find if it is a shift in language instead of a shift in practice, more urban coastal cities should be researched.

The aim of this thesis was to compare two case studies, New York and Rotterdam, by looking at the development of flood management discourse and the shift that has taken place in flood management according to the literature. Thereby, this thesis has made use of a case study approach, by looking at New York and Rotterdam. These two urban coastal cities are similar and at the same time different which makes it interesting to compare. It also reveals strongly the difference in the flood management tradition, explained in the theoretical background. New York and Rotterdam are clearly different from each other looking at the flood management discourse. These case studies have given a western view on the development of the flood management discourse. Another research can compare the development of the flood management discourse of developing countries to get a different view on how flood management has been developed in language and practice.

Furthermore, a discursive approach is used to analyze newspapers and the policy field with the program Atlas.ti, a useful tool to analyze data. This thesis has focused on the use of language and thereby I have not conducted interviews. Interviews can give another view on the policy field analysis, by interviewing policy makers which will give a different perspective than only giving the institutional context as well as an analysis of the policy documents. Furthermore, not all policy documents were updated yet. An updated policy document can give a different perspective as well on the policy field analysis. A difficulty in the newspaper analysis was defining the time frame. Using

a time frame can make the research more specific, but this thesis has focused on the development of the flood management discourse and thereby it is about what you find along the way. Therefore, a time frame is not necessary.

6.4 Recommendations

The section above made clear that it is interesting to see if the shift in flood management is only a shift in language as well as in other urban coastal cities, or that the shift in flood management is also visible in practice in other urban coastal cities. Furthermore, it can be interesting to see if the flood management discourse of New York or Rotterdam is the same in other cities in that particular country. So, is the flood management discourse of New York the same as the flood management discourse in New Orleans. This can give a more complete perspective on the flood management discourse of a country.

As the use of language was important in this thesis, there were no interviews done with policy makers to give another perspective on the flood management discourse. Therefore, recommendations can be given for further research, by researching other urban coastal cities as well as urban coastal cities in the same country to see if the flood management discourse is the same and develops the same. And recommendations can be given for further research by doing interviews which gives a new perspective to the policy field analysis instead of only looking at language. These recommendations can give a better understanding and a wider perspective on the flood management discourse and the influence of culture and events on the flood management discourse.

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Appendix

Newspaper articles United States

The New York Times:

- After long standoff, water is declared the winner. February 4, 2007
- California floods change thinking on need to tame rivers. February 4, 1997
- Call for change ignored, levees remain patchy. June 22, 2008
- Concern over flooding. March 21, 1982
- Flood-control policy, shift is meeting scant success. March 19, 1997
- Lessons for U.S. from a flood-prone land. November 15, 2012
- After the flood; with a billion of dollars in damage, New Jersey will be wringing out a long time. October 17, 1999
- Hoboken mayor seeks storm protection more suitable for high-rise buildings. February 13, 2013
- Learning to bounce back. November 3, 2012
- New York is lagging as seas and risks rise, critics warn. September 11, 2012
- Paying to rebuild, and rebuild again. November 18, 2012
- Post-storm cost may force many from coast life. November 29, 2012
- The warming world: coping with climate change; experts on climate change pondering: How urgent is it? September 9, 1997
- U.S. warns that climate change will cause more energy breakdowns. July 11, 2013
- What will it take to safeguard New Orleans? September 11, 2005
- A city at sea. September 25, 2005
- Storm clouds. June 24, 2007
- The storm, next time. June 13, 2013
- Wetlands in city's watershed fall under new federal controls. September 11, 2000
- A plan aims to reconnect residents with the East river Waterfront. February 7, 2013
- After getting back to normal, big job is facing new reality. November 4, 2012
- Engineers' warnings in 2009 detailed storm surge threat to the region. November 5, 2012
- How safe is my home? March 11, 2007
- Reading earth's future in glacial ice. November 14, 2010
- To save city from storm surges, no miracles required. June 28, 2013
- Weighing sea barriers as protection for New York City. November 8, 2012
- As coasts rebuild and U.S. pays, repeatedly, the critics ask why. November 19, 2012

- Flood insurance, already fragile, faces new stress. November 13, 2012
- House approves creation of a Federal Disaster Insurance Program. November 9, 2007
- For years, warnings that it could happen here. October 31, 2012
- Push to prepare city's buildings for next storm. June 14, 2013
- \$20 billion plan to shore up city as climate shifts. June 12, 2013
- A Mittenless autumn, for better and worse. December 23, 2001
- City must prepare for effects of global warming, Mayor's Panel says. February 18, 2009
- Cooperation is at issue in climate change fight. February 17, 2012
- Cuomo is seeking to curb building in flooded area. February 4, 2013
- Forecast for New York this century: hotter and wetter. June 27, 2004
- Global warming, local damage. July 15, 2007
- Global warming; getting New York ready for a hotter, wetter future. December 1, 1997
- High and dry? October 2, 2011
- Homeowners in flood zones opt to rebuild after hurricane, not relocate. April 27, 2013
- Hurricane exposed flaws in protection of tunnels. November 10, 2012
- In series of flyovers, a scientific snapshot of the city. May 10, 2010
- Mayor pledges to rebuild and fortify coast. December 7, 2012
- Mayor praised for Storm-Protection Plan, but obstacles stand in its way. June 13, 2013
- New data on climate depict a city more at risk. June 11, 2013
- On ravaged coastline, it's rebuild deliberately vs. rebuild now. December 22, 2012
- Protecting the city, before next time. November 4, 2012
- Reckoning with realities never envisioned by city's founders. October 31, 2012
- Report warns New York of perils of global warming. June 30, 1999
- Severe weather warning. August 2, 1998
- Storm panel recommends major changes in New York. January 7, 2013
- Study predicts floods in city if the climate gets warmer. July 12, 2007
- Study sees hard future if climate keeps heating. June 20, 2000
- The real luxury: a way out. November 4, 2012
- Twice as many structures in FEMA's redrawn flood zone. January 29, 2013
- Vetoing business as usual after the storm. November 20, 2012
- Warming's effects to be widespread. June 12, 2000
- Where streets flood with the tide, a debate over city aid. July 10, 2013
- Worrying beyond hurricane Sandy. November 1, 2012

USA Today:

- A year after flood, Cedar Rapids fights back; recovery is slow, costly in Iowa City. June 16, 2009
- City's progress mixes with pain; New Orleans notes improvements five years since Katrina horrifically altered landscape, psyche. August 27, 2010
- Disasters the 'new normal'. January 3, 2008
- New Orleans' recovery slow and slippery process; rebuilding underway but in the same flood-prone places. August 23, 2006
- Next stop for subway: draining the tunnels. November 1, 2012
- \$ 700M in federal aid finally flowing to N.O.; Mayor: City to get busy rebuilding this year. March 18, 2009
- FEMA halts flood insurance payments. November 17, 2005
- High-risk life, high expense to taxpayers Federal disaster aid makes it feasible to build in harm's way. July 24, 2000
- Insurance underwater; huge losses put federal plan in the red, review finds. August 26, 2010
- Panel to urge national safety standards for levees; Federal committee's preliminary findings show that no one really knows if the barriers could withstand a flood. December 22, 2008
- Sandy reminds us of coastal hazards. November 2, 2012
- U.S. cracks down on worn levees; 114 flunked by corps lose aid. February 24, 2009
- When the government sells insurance, everybody pays. November 12, 2007
- Wind or flood? Fights with insurers loom. September 20, 2005
- Sandy revives debate over rising sea level; scientists warn every inch plays a role in storms. November 28, 2012
- Sandy signals an era of extreme weather. October 31, 2012

De Telegraaf:

- Risico op overstroming is niet langer te negeren. July 28, 2011
- Waterveiligheid verliest prioriteit. January 11, 2012
- Aanleggen van waterbekkens goedkoper dan dijken bouwen. November 22, 2000
- Amerikaanse delegatie bestudeert deltawerken. December 28, 2005
- Amerikanen kijken kunst af. January 12, 2006
- Bakkeleien met verzekeraars; ik geef de vaatwasser de schuld, anders krijg ik niks. January 18, 2012
- Brad de bouwer.; Nederlands architectenbureau betrokken bij huizenopbouw New Orleans. May 7, 2008
- Burger betaalt mee aan bestrijding wassende water. September 1, 2000
- Catastrofe. July 27, 2010
- CDA wil deltaplan; Voorbereiden op stijgende zeespiegel, Van Geel: niet langer wachten. May 31, 2008
- Deltawerken in gevaar als we niets doen. January 31, 2003
- Dijken. October 23, 2004
- Dijken geven vals gevoel van veiligheid. June 19, 2004
- Dijken onder de loep. December 8, 2012
- Evacueren met computer. March 19, 2005
- Geef water de ruimte. February 24, 2007
- Geklungel. April 17, 2012
- Gemeente alarmeert burger op mobieltje. July 14, 2006
- Geruisloos ten onder. April 28, 2012
- Getijdeneconomie geeft de Zeeuwse delta flink impuls. January 15, 2009
- Haskoning ontwerpt stormatlas; New Orleans vreest orkaanseizoen. June 5, 2009
- Help, Nederland. January 19, 2007
- Hoe houdt Nederland de voeten droog; Creatieve oplossingen beschermen huizen tegen wateroverlast. October 27, 2010
- Hoofdartikel: Waterbeleid. September 1, 2000
- In Hollands glorie New Orleans. August 28, 2010
- Kans op overstroming huis wordt onderschat. September 1, 2010
- Landkaart in de auto voor overstromingen. March 26, 2006
- Maeslantkering de grootste robot ter wereld. October 28, 2003

- Mammoettankers tegen overstroming; Delfland onderzoekt bijzondere kustbescherming. December 18, 2008
- Minder kans op overstroming; Risico watersnood Schiphol verkleind. September 13, 2011
- Nederland is nog lang niet 'af'. December 6, 2003
- Nederlandse watersector scoort via blauwe loper. November 1, 2011
- Niet voorbereid op overstroming. February 6, 2009
- Overstromingsdekking niet verplichten. June 22, 2013
- Overstromingspolis laat op zich wachten. May 2, 2009
- Overstromingsrisico groter dan gedacht; Rapport ligt al maanden in Den Haag. May 26, 2001
- Overstromingsrisico voor legio woningen. November 10, 2006
- Polderdijken lopen gevaar. March 11, 2008
- Polis tegen natuur-geweld. September 6, 2012
- Polis tegen waterramp. August 25, 2008
- Polis watersnood kost stevige duit. October 25, 2012
- Pool smelt: Nederland zal overstromen. December 13, 2006
- Rampen dreigen achter dijken. April 21, 2009
- Recht op droge voeten; VEH pleit voor verplichte verzekering tegen overstromingen. August 23, 2007
- Rotterdam bouwt drijven stad aan oude stadshavens; Vijfduizend woningen. May 8, 2008
- Rotterdam helpt New Orleans bij strijd tegen wateroverlast; Amerikanen lovend over Maasstad. May 29, 2009
- Rotterdam houdt top deltasteden; Ervaringen delen over klimaatveranderingen. May 17, 2013
- Ruimte voor water. March 5, 2005
- Schadepremie hoger door stormen; Klimaatverandering drukt op uitkeringen verzekering; Meer schade in Europa verwacht. June 2, 2008
- Strijd tegen water kost 25 mld. August 31, 2000
- Tijd voor investeren, niet schuld verlagen. December 7, 2006
- Verzekering tegen overstroming - De Vries; Overheid nog slechts vangnet. June 7, 2000
- Vierduizend doden bij overstroming Randstad. December 5, 2006
- Vluchten voor orkaan Irene; Nederlander waarschuwde New York. August 27, 2011
- Voortbestaan. July 28, 2010
- Water. November 14, 2008
- Water over de dijken! June 24, 2006
- Waterpleinen op top deltasteden. June 6, 2013

- Watersnood dreigt voor Groene Hart en Schiphol. July 27, 2010
- Wonen op een klimaatdijk; Nieuwe waterkering tegen stijgende zeespiegel. July 8, 2009
- Woningbouw op water. September 7, 2002
- Zeeland niet klaar voor overstroming. October 31, 2002

Algemeen Dagblad:

- 500 Miljoen euro per jaar nodig voor dijkversterking. October 14, 2005
- Sandy was vreselijk, maar we leven nog. November 16, 2012
- De prins weet meer dan 5 ingenieurs. October 1, 2011
- Derde van de dijken is niet veilig genoeg. November 30, 2011
- Nederland kan veel meer water aan. January 7, 2012
- Rijk betaalt bij overstroming. September 25, 2012
- David Letterman prijst Nederland om dijken. November 9, 2012
- Denken over gevolgen ramp is nieuw. June 30, 2008
- Deskundige - 'Veiligheid is een kwestie van geld. October 15, 2005
- Dijken achter ontoereikende Maeslantkering opgehoogd. February 22, 2007
- Dijken al vijftig jaar lang ondermaats - Deskundigen luiden noodklok: politiek trekt te weinig geld uit voor strijd tegen hoog water. October 18, 2006
- Dijkenplan New Orleans ontwerp van Nederlandse bedrijven moet overstroming tegengaan. March 13, 2007
- Dijkversterking levert bouw miljoenklus op. June 13, 2013
- Dordrecht in de ban van horrorscenario's. January 26, 2013
- Drijvende woonwijk in onder water gezette polder. June 20, 2008
- Duimen gaan omhoog voor militairen in de stad. October 13, 2012
- Fikse schade door donder en bliksem. August 27, 2011
- Handen uit de mouwen voor droge voeten. September 4, 2008
- Herstel van kust is beter dan aanleg eiland in Noordzee. November 17, 2007
- Hoe hou je droge voeten? December 15, 2005
- Hollandse waterkennis moet New York redden. April 30, 2013
- Huiseigenaar wil zich best beschermen tegen overstromingen. January 19, 2010
- Iedereen moet zichzelf kunnen redden. October 31, 2008
- Ingenieursbureau DHV onderzoekt veiligheid dijken. September 21, 2007
- Kustbescherming, zwakste schakels in onze zeekering worden snel aangepakt - Gevecht tegen de zee houdt maar aan. September 6, 2007
- Laaggelegen woning iets goedkoper. June 11, 2013

- Lonken naar orders in de VS - Nederlandse bedrijven zien in New Orleans volop kansen. May 9, 2006
- Maeslantkering hapert te veel Provincie bang voor overstromingen, dijken Zuid Holland moeten hoger. February 11, 2006
- Meer regen wordt normaal. September 12, 2005
- Meeste havens niet voorbereid op zeespiegelstijging. May 25, 2011
- Met droge voeten van A naar B. September 15, 2005
- Miljarden in droge-voetenfonds; Hollandse kust moet stuk breder. September 3, 2008
- Nederland bovenaan risicolijst. September 3, 2011
- Nederland is niet goed voorbereid op ramp of aanslag. August 21, 2007
- Niet bij dijkverhogingen alleen. September 17, 2007
- Orkaanstad New Orleans voelt zich veilig achter Hollandse dijken. August 29, 2012
- Oude vijand, nieuwe wapens; Extra barrières en overloopgebieden moeten het water in Nederland in toom houden. October 13, 2005
- Randstad kansloos bij ramp; Na overstroming te krappe wegen en te weinig reddingsmiddelen - Jane Fonda op bezoek in Nederland. October 13, 2005
- Record aan claims door extreem weer. August 7, 2012
- Reken bij ramp niet meteen op overheid. April 4, 2008
- Verplicht verzekerd tegen overstroming. January 26, 2013
- Watersnoodramp? Vlucht naar zolder! January 31, 2013
- Weer een mislukte klimaatop. December 11, 2010
- Wie geen watersnoodramp wil, belt een Hollander. May 30, 2013
- Ziekenhuis moet zich beter op ramp voorbereiden. June 23, 2008

End notes

ⁱ In Dutch: “De aantoonbare cultuurverschillen tussen landen zijn geworteld in de geschiedenis. Ze worden gedeeltelijk weerspiegeld in de instituties (gezien, school, kerk, werk-organisaties, overheden, wetten en rechtspraak) van de betrokken landen, èn in de ideeën die in een land populair zijn. Wat in een land recht is, is cultureel bepaald. Instituties op hun beurt dragen bij aan het in stand houden van de cultuur waaruit zij zijn voortgekomen. Daardoor zijn culturen en cultuurverschillen historisch verrassend stabiel.”

ⁱⁱ In Dutch: “De Amerikaanse maatschappij is veel minder door de overheid gestuurd, veel individualistische [...]”

ⁱⁱⁱ In Dutch: “De laatste weken hebben we heel wat wateroverlast ervaren in Nederland. Mensen hadden zichtbaar moeite het water buiten te houden. Toch onderschatten we nog steeds de kans dat we op deze manier door de natuur getroffen worden.

^{iv} In Dutch: “Overwogen word om de normen voor de dijken aan te scherpen. Voor zeedijken geldt dat de kans op een overstroming één keer in de 10.000 jaar mag zijn. Maar dat is in 1960 vastgesteld.”

^v In Dutch: “[...] jaarlijks een kleine kans op falen: gemiddeld eens in de 10.000 jaar. Dat lijkt een kleine kans, maar [...] in de vliegtuigbouw eisen aan het vliegtuig worden gesteld met een veel langere faalkans.”

^{vi} In Dutch: “Inmiddels is gebleken dat de Maeslantkering niet voldoet aan de huidige normen wat betreft faalkans.”

^{vii} In Dutch: “Opwarming en klimaatveranderingen drijven de zeespiegel langs de Hollandse dijken de komende veertig jaar met 30 tot 60 centimeter omhoog.”

^{viii} In Dutch: “Het noodweer doet denken aan alle voorspellingen van klimaatverandering. In Nederland zou klimaatverandering zorgen voor extremer weer: meer sneeuw in de winter, periodes met droogte - [...] - en in de zomer meer regen, die in korte tijd heel lokaal valt. Zo ongeveer wat afgelopen dagen gebeurde, maar toch ziet Harry Geurts van het KNMI hierin niet een bewijs van klimaatverandering.”

^{ix} In Dutch: “Alsof de duivel ermee speelt: uitgerekend tijdens de zeer zware storm gisteren lanceerden de belangrijkste Nederlandse klimaatwetenschappers een angstig rapport over de gevolgen van de klimaatveranderingen voor Nederland. Extreme hoosbuien, hittegolven, overstromende rivieren, ze worden doodnormaal.”

^x In Dutch: “De fl2,6 miljard die nu jaarlijks wordt uitgegeven is volstrekt onvoldoende om de gevolgen van klimaatverandering, zeespiegelstijging en bodemdaling te kunnen opvangen, [...]”

^{xi} In Dutch: “De onderzoekers, gesteund door maar liefst 21 wetenschappers en andere deskundigen, zijn het over een ding eens: de klimaatwijzigingen kunnen eigenlijk alleen maar worden verklaard door menselijke invloeden.”

^{xii} In Dutch: “De risico’s zullen in korte tijd veel groter geworden door de concentratie van mensen, bedrijven en goederen in uiterwaarden en kustplaatsen.”

^{xiii} In Dutch: “Als wetenschapper kan ik dan alleen maar hopen dat het voor het klimaat niet te laat is. Metz, die vijf klimaattoppen terug al zei dat zijn kinderen het wel zouden rooien maar hij zich ernstig zorgen maakte voor

zijn kleinkinderen, ergert zich aan de politiek, die ronkende verklaringen aflegt, maar er in de onderhandelingen toch weer bij laat zitten.”

^{xiv} In Dutch: “Als de klimaatwetenschap zich al heft vergist, dan enkel in het tempo waarin de aarde opwarmt. Maar dat heeft de politiek ook op de vannacht beëindigde klimaatop in Cancun weer niet tot actie aangezet.”

^{xv} In Dutch: “Uit onderzoek naar de gevolgen van de klimaatverandering blijkt dat overstromingen een steeds groter gevaar worden voor Nederland.”

^{xvi} In Dutch: “De acute dreiging van het hoogwater lijkt voorlopig geweken, maar volgens de Vereniging Nederlandse Riviergemeenten ligt met de dalende waterpeilen een ander groot gevaar op de loer: het verminderen van de aandacht voor waterveiligheid.”

^{xvii} In Dutch: “We krijgen last van het water door bijvoorbeeld de hoge grondwaterstanden, de stijgende zeespiegel, bodemdaling en veel meer regenwater, waarschuwt Schultz van Haegen [...]”

^{xviii} In Dutch: “Deltasteden uit de hele wereld zijn binnenkort drie dagen te gast in Rotterdam om hun ervaringen te delen op het gebied van klimaatverandering en extreme weersituaties en om daar oplossingen voor te bedenken.”

^{xix} In Dutch: “Rotterdam zelf zal in de belangstelling staan met het programma Climate Proof, waarvoor burgemeester Ahmed Aboutaleb begin deze maand op uitnodiging van oud-president Bill Clinton nog in Amerika is geweest voor overleg met onder andere burgemeester Bloomberg van New York.”

^{xx} In Dutch: “Een groot deel van de zeehavens wereldwijd is niet berekend op zelfs maar een beperkte stijging van de zeespiegel. Zij dreigen tegen het eind van deze eeuw in ernstige problemen te komen. Zeehaven Rotterdam ziet voor zichzelf door de goede waterkeringen geen probleem.”

^{xxi} In Dutch: “De meeste havens zijn alleen al door hun ligging, aan de kust of riviermondingen, uiterst kwetsbaar voor de combinatie van een stijgende zeespiegel en stormen.”

^{xxii} In Dutch: “Eén op de drie Nederlandse waterkeringen voldoet niet aan de veiligheidseisen. Dat blijkt uit een zesjaarlijkse toets van in totaal 3767 kilometer dijken, dammen en duinen.”

^{xxiii} In Dutch: “De beroemde Amerikaanse tv-presentator David Letterman vindt dat New York een voorbeeld moet nemen aan de Nederlandse Deltawerken. [...] De Amerikanen kijken vooral jaloers naar de Maeslantkering in de Nieuwe Waterweg, die bij stormvloed gesloten kan worden.”

^{xxiv} In Dutch: “Dijken moeten op de juiste hoogte en sterkte worden gebracht. Bouwen in de uiterwaarden kan niet meer. De rivieren hebben deze ruimte nodig als overloopgebied.”

^{xxv} In Dutch: “We kunnen niet eindeloos doorgaan met het ophogen van dijken, gebaart Saeijs. Een simpel rekensommetje geeft hem gelijk: een dijkje uit de twaalfde eeuw ([...]) had over 100 meter lengte een volume van 6000 kubieke meter. Maar een moderne zeedijk ([...]) heeft een omvang van maar liefst 80.000 kubieke meter. Als we zo doorgaan worden de dijken te zwaar, nemen te veel ruimte in of worden te kostbaar. Ze bezwijken onder hun eigen gewicht.”

^{xxvi} In Dutch: “Eén van de diepste polders is de Rotterdamse Alexanderpolder, die ruim zeven meter onder NAP ligt. Deze polder is na zijn bebouwing al meer dan 45 centimeter gezakt.”

^{xxvii} In Dutch: “Nederland moet zich dringend beter beschermen tegen het water en dat betekent: nieuw werk voor de bouw. De komende 6 jaar, [...], moet verspreid over het land zeker 180 kilometer dijk worden versterkt.”

^{xxviii} In Dutch: “Om toekomstige gevaren te bezweren moet Nederland af van de gebaande paden, denkt Veerman. Al eeuwenlang heeft Nederland zich laten leiden door ‘versterken, verhogen en afsluiten’, weet Veerman. Maar dat helpt op den duur niet. [...] Creatieve ideeën zoeken om de problemen op te lossen. Zoiets als het plan om drijvende huizen in de uiterwaarden te bouwen om te voorkomen dat de woningen bij hoog water onderlopen.”

^{xxix} In Dutch: “Terpen zijn beslist niet ouderwets. Moderne terpen zijn hoog opgespoten stukken land, zoals het landdeel van de Rotterdamse havens, het Botlekgebied, de Maasvlakte, het Zeeuwse Sloegebied en het havenindustrigebied van Delfzijl. Terpen bieden de ultieme veiligheid.

^{xxx} In Dutch: “Industrieën weten dit en nemen geen risico’s. Als het water dramatisch stijgt, en de dijken bezwijken, krijg je op zo’n moderne terp slechts natte voeten.”

^{xxxi} In Dutch: “Iedere Nederlandse burger moet een speciale landkaart thuis en in de auto hebben met daarop veilige vluchtroutes bij een overstroming. Staatssecretaris [...] Schultz van Haegen wil hetzelfde type kaart gebruiken dat de evacuatie van New Orleans [...]”

^{xxxii} In Dutch: “De taakgroep noemt een nationale evacuatieplanning onontbeerlijk en vindt dat over drie jaar een nieuwe grote overstromingsoefening moet worden gehouden.”

^{xxxiii} In Dutch: “Grote evacuatieplannen voor complete regio’s bij extreme overstromingen kent Nederland niet. Eerder deze week pleitte minister Schultz van Haegen (Infrastructuur) daar wel voor. [...] Maar volgens de minister valt daar ook ‘evacueren naar de zolder’ onder. Het gaat erom dat je beseft dat die storm kan komen en dat je dan ook weet wat je moet doen, [...]”

^{xxxiv} In Dutch: “Schultz van Haegen was tijdens haar tweedaagse bezoek aan de door de orkanen Katrina en Rita getroffen gebieden zeer onder de indruk van de evacuatieplannen.”

^{xxxv} In Dutch: “De kans is heel klein dat het gebeurt, maar toch denken hulpverleners sinds drie jaar serieus na over dit soort rampscenario’s. De verwoesting van New Orleans in 2005 heeft in Nederland veel hulpverleners de ogen geopend. We hebben het niet over een straatje dat blank staat, maar een grote, langdurige overlast, zegt Ruurd Reitsma van de Taskforce Management Overstromingen, [...]”

^{xxxvi} In Dutch: “Je kunt een waterwijk realiseren met drijvende hotels, winkels en kantoren. Door koppeling van meerdere platforms zijn gebouwen van vele honderden vierkante meters vloeroppervlak realiseerbaar.”

^{xxxvii} In Dutch: “Daarnaast zal de futuristische stad bestaan uit drijvende horeca en attracties (waaronder markten en een park) en uit watersportvoorzieningen.

^{xxxviii} In Dutch: “De kust langs grote dele van Noord- en Zuid-Holland moet worden verbreed. Dat kan onder meer door voor de kust miljoenen kuub zand te storten, dat zich vervolgens door de wind, golven en stroming op natuurlijke wijze verspreid.”

^{xxxix} In Dutch: “En zo’n storm kunnen we anno 2013 opvangen. Een storm die onze dijken wel doet barsten, komt eens in de 10.000 jaar voor. De kans is dus klein, maar het kan morgen raak zijn. Het is als met een staatslot: kleine kans: maar de prijs gaat vallen.”

^{xi} In Dutch: “Uit een keuring vorig jaar bleek dat van alle dijken een kwart niet aan de wettelijke eisen voldoet.”

^{xli} In Dutch: “Als in 1957 in de Deltawet is vastgelegd hoe hoog de dijken moet zijn, waarom voldoen we daar vijftig jaar later niet aan?”

^{xlii} In Dutch: “Volgens de hoogleraar zou het echter verstandig zijn om in de gebieden met de grootste risico’s de faalkans met een factor tien op te schalen. Dan weten we zeker dat we onze voeten droog houden.”

^{xliii} In Dutch: “Momenteel wordt er geëxperimenteerd met geotextiel, een supersterk vezel dat de grond vasthoudt. Maar in de toekomst zal er vooral meer hightech in en op de dijken worden geplaatst. [...] Sensoren in de dijken worden gekoppeld aan satellieten en meten verschuivingen van enkele millimeters.”

^{xliv} In Dutch: “Twee enorme ijzeren armen moeten bij storm vanaf zee het kanaal voor te hoog water afsluiten, maar blijken een op de negen keer dienst te weigeren. Volgens de veiligheidsnorm mag dit slechts eens in de duizend keer gebeuren.”

^{xlv} In Dutch: “Uit eerste onderzoek blijkt dat de kans op ‘niet sluiten’ van de kering slechts verlaagd kan worden naar eens in de honderd keer. Dat is nog steeds tien keer minder veilig dan afgesproken.”

^{xlvi} In Dutch: “In Nederland geldt dat dijken in 2015 berekend zijn op 16.000 kubieke meter waterafvoer per seconde bij Lobith en later zelfs op 18.000 kubieke meter. Er is overleg, maar in Duitsland ziet het er naar uit dat men voorlopig niet verder gaat dan 15.000 kubieke meter. Dat kan een bedreiging zijn.”

^{xlvii} In Dutch: “Op dit moment hebben de waterschappen ruim 90 procent van de primaire waterkeringen in ons land in beheer. Rijkswaterstaat beheert bijna 10 procent. De provincies spelen de rol van toezichthouder.”

^{xlviii} In Dutch: “Bij storm, hoog water en hevige regenval komt het waterschap samen met het vrijwillige dijkleger in actie om te zorgen dat ook tijdens barre weersomstandigheden Holland een leefbaar land is en blijft.”

^{xlix} In Dutch: “Bestuurders moeten de onderlinge taken beter op elkaar afstemmen en tot uitwisseling van informatie komen.

ⁱ In Dutch: “We willen geen paniek zaaien, maar we willen mensen er wel alert op maken. Daarnaast willen we de partijen oproepen om op korte termijn met elkaar in overleg te gaan over ieders rol, taak en verantwoordelijkheid. Het kan en mag niet zo zijn, dat er nu - een jaar na de ramp in New Orleans door de orkaan Katrina - nieuwe situaties ontstaan, waarbij de waterveiligheid niet goed is geregeld.”

ⁱⁱ In Dutch: “Veel van die bewoners hebben er volgens het waterschap geen flauw benul van dat ze buitendijks wonen: voor een dijk in plaats van erachter.”

ⁱⁱⁱ In Dutch: “Na de overstroming in Zeeland in 1953 schrokken verzekeraars van de omvang van de schade, die toen vaak wel verzekerd was. Die bedroeg toen omgerekend naar het huidige prijspeil een bedrag dat vergelijkbaar was met de schade veroorzaakt door orkaan Katrina, [...]. Daarna ging de overstromingsverzekering in de ban en is er eigenlijk nooit meer uitgekomen.”

^{liii} In Dutch: “Nu zijn consumenten en bedrijven bij een overstroming aangewezen op een compensatieregeling van de overheid. Een uitkering is daarbij geen zekerheid.”

^{liv} In Dutch: “Nederland is bovendien het enige Europese land waar het overstromingsrisico niet te verzekeren is.”

^{lv} In Dutch: “Nu zien verzekeraars het door de klimaatverandering als hun plicht om schade aan huizen en spullen als gevolg van overstromingen weer te dekken. Telkens als er een grote overstroming is, wordt naar de verzekeraars gekeken. Verzekeren is onze kerntaak, daarom moeten we dit als sector oppakken, [...]”

^{lvi} In Dutch: “Het Verbond van Verzekeraars wil dat de overheid een deel van de kosten van een dergelijke verzekering op zich neemt. Een overstroming levert volgens de verzekeraar zoveel schade op, dat een verzekeraar alleen die niet kan dragen.”

^{lvii} In Dutch: “De strijd tegen het water zit in ons dna, laat D66-wethouder Alexandra van Huffelen (Duurzaamheid) weten. Wij zijn hier in de Rotterdamse regio heel erg bezig met preventie: hoe voorkomen we dat we natte voeten krijgen?”

^{lviii} In Dutch: “Nederland staat op een keerpunt in zijn niet aflatende strijd tegen het water. Eeuwenlang zijn dijken aangelegd om het land tegen het water te beschermen. Die kunnen echter niet tot in het oneindige worden verhoogd.”

^{lix} In Dutch: “De Nederlandse reputatie op het gebied van water is ijzersterk. Niet alleen socren wij goed in de harde techniek zoals dijken en dammen, ook weten we onze zachte waterkennis [...]. De strijd tegen het water is langzaam omgevormd tot werken met het water.”

^{lx} In Dutch: “[...]: ‘bouwen met de natuur’ wortelt in het verleden en wijst naar de toekomst - [...]. Gefaseerd herstellen we de historische kustlijn van het begin van de Gouden Eeuw. En met natuur als belangrijkste component is de methode gericht op duurzaamheid.”

^{lxi} In Dutch: “De polder is straks zowel een woonwijk als een opslagplaats voor water. Op die manier hoeven we nooit meer water weg te pompen, [...]. Sterker nog, er kan gemakkelijk dertig centimeter bij. De drijvende woningen kunnen gewoon mee omhoog.”

^{lxii} In Dutch: “[...] een innovatief concept bedacht waarbij het leven met de zee centraal staat: de getijdeneconomie.”

^{lxiii} In Dutch: “Door juist gebruik te maken van de kracht van het water zonder dat de veiligheid van bewoners en gebruikers in het geding komt. Het getij biedt mogelijkheden voor wonen, werken, recreatie, landbouw, natuur, veiligheid en meervoudig ruimtegebruik, [...]”

^{lxiv} In Dutch: “Deze stad heeft prachtige plannen voor een zogenaamde trapdijk, waarbij op het niveau van de ‘treden’ woningbouw mogelijk is, of het parkeren van auto’s.”

^{lxv} In Dutch: “De zeespiegel stijgt en de afvoer van rivierwater neemt toe. [...] de dijken de komende jaren met een factor 10 verbeterd moeten worden. Daarbij stelt Veerman zich een soort Deltadijk voor: een hoge, brede, sterke dijk waarbij een oncontroleerbare overstroming vrijwel nihil is. Kort daarna was het woord klimaatdijk geboren: een verzamelnaam (de woorden terpdijk en superdijk zijn ook in omloop) voor zo’n sterke waterkering die tot in lengte van jaren veiligheid biedt.”

^{lxvi} In Dutch: “De komende decennia staan wij voor grote nieuwe uitdagingen. Klimaatverandering, toenemende verzilting en veranderingen in het landschap vragen om aanpassingen in de waterhuishouding. Dat de klimaatverandering doorzet, trekt vrijwel niemand meer in twijfel. De exacte gevolgen zijn alleen nog niet te overzien. Vast staat wel dat de zeespiegel stijgt en het weer extremer wordt.”

^{lxvii} In Dutch: “Er gaat geen dag voorbij of voorspellingen over klimaatontwikkelingen worden via de media aan ons gepresenteerd. Water is hierbij één van de belangrijkste thema’s. Duidelijk is dat we de komende decennia steeds meer water te verwerken krijgen. En dat water komt, voor Rotterdam, letterlijk van vier kanten; vanuit de zee, de rivieren, de lucht en uit de grond. Het waterprobleem is reeds urgent en wordt alleen maar groter. De gevolgen van klimaatveranderingen zijn al zichtbaar.”

^{lxviii} In Dutch: “Juist de ambitie om de samenwerking tussen overheidsdiensten onderling beter te maken, alsmede de banden met projectontwikkelaars, woningbouwcorporaties en waterschappen te intensiveren, spreekt Brakman in Waterplan 2 Rotterdam erg aan. [...]. Alleen in een gezamenlijk poging kun je het water de baas blijven. Dat is de les die ik [...] heb geleerd.”

^{lxix} In Dutch: “De wateropgave en stedelijke opgave beïnvloeden elkaar wederzijds. Het gaat hierbij om zogenaamde coalitieprojecten. Een significante wateropgave kan leiden tot een programma met een waterrijk woonmilieu en de plekken waar herstructureringsplaatvinden, zijn bij uitstek geschikt voor aanpassingen aan het water systeem.”

^{lxx} In Dutch: “Het Deltaprogramma zal ook aandacht schenken aan het concept meerlaagsveiligheid en daarmee naast preventie aan het beperken van de gevolgen van een overstroming door een betere ruimtelijke inrichting en adequate rampenbeheersing.”