

# WATER AWARENESS, BEHAVIOUR AND GEO-POLITICS IN SOUTH- AND CENTRAL- LIMBURG: THE MEUSE-ISLAND CASE

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*- Master thesis Human Geography – Radboud University – Nijmegen School of Management -*



# WATER AWARENESS, BEHAVIOUR AND GEO-POLITICS IN SOUTH- AND CENTRAL- LIMBURG

*THE MEUSE-ISLAND CASE*

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## PREFACE

NIJMEGEN - July 2015

Here it is: the final piece of my master in human geography. The past five years of studying human geography have been an immersive journey with many discoveries and new experiences on the road. Next to the journey through the theoretical field of human geography, practice brought me to many places, close and far away, which enabled me to see concepts getting alive. The journey of this thesis took me to the Meuse-Island. Even though this is not the most tropical destination I have been to, it did not feel less like a discovery tour. By slow train and on my OV-fiets (*rental bike*) I braved (metaphorical) headwinds, hills and storms. Yet, it would not be fair to claim that I have braved these challenges on my own. I am most grateful to all who have been a part of this process: although their names do not appear on the front page of this study, their support was of great value to me.

Firstly, I would like to thank colleagues of my internship organization Royal HaskoningDHV and the partner organization Waterschap Roer en Overmaas for providing a stimulating working environment. In particular, the guidance of my supervisor Roel van de Laar throughout the whole process helped me to find my way in studying the Limburgian water awareness and management. His patience and feedback were very valuable throughout the process. In addition, I want to thank Gert-Jan Meulepas and Margriet Hartman for their feedback and their involvement in this study. Furthermore lunch breaks and other sessions with colleagues made me feel challenged and welcomed at Royal HaskoningDHV.

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Thirdly, thanks are due to all respondents of this study. Without the people from the Meuse-Island and the Limburgian experts, this study would not have been possible. Their hospitality and willingness to cooperate in my study were extraordinary. Next to enjoying the Limburgian hospitality, cycling around in the beautiful landscape of the Meuse-Island has been a great pleasure to me. I envy the people of the Meuse-Island for their inspiring surroundings and wish them many years of safe enjoyment of their beautiful environment.

Last, I always felt supported by the people close to me. I want to thank my friends in Nijmegen for coffee breaks, sharing challenges and support. The coffee breaks helped me to see things in perspective and to find new inspiration for working on this thesis. I also want to thank my family for their patience, love and support. I am most grateful for their unconditional support during the journey of the past years.

*Stefan Robert Ramaker*



## SUMMARY

Around Christmas 1993, many people in the South of the Netherlands were confronted with the highest water levels of the Meuse River in the 20<sup>th</sup> century. Even though many people considered their situation as safe before this shock event, the flood functioned as a wake-up call for inhabitants and authorities in the South of the Netherlands. Especially the province of Limburg was affected by the flood of 1993. More than 12,300 Limburgian people left their homes and an area of 46,000 acres was inundated. Water managers in Limburg and the rest of the country realized that the threat of floods is not only coming from the sea. This understanding got even stronger when the Meuse caused another flood by 1995.

For national and regional policymakers, it was absolutely clear: preventive measures had to be undertaken in order to prevent Limburg and the downstream regions from another flood. The so-called *emergency levees* had to provide some protection for the first few years, in anticipation of large water safety projects which were designed to deepen and widen the riverbed of the Meuse River. Now, 20 years after the flood of 1995, the last water safety projects are designed in order to reach the aimed protection levels. However, the awareness of risks and the Limburgian landscape of water safety have not stood still in the past decades. As indicated by different water managers, the predominantly positive attitude of people in South- and Central- Limburg towards new water safety measures is now much weaker than it used to be in the first years after the shock events. According to some of these water managers, people in South- and Central- Limburg are not aware of the risks they are exposed to.

Following the claim that people are not aware of the risks they are exposed to, this study aims to research how people in South- and Central- Limburg- experience water safety and how the awareness of people is related to the changes in the landscape of water safety in the province. Following the aims of this research described above, the following research objective was identified:

*The aim of this study is to contribute to future water safety policies that are in line with the ways in which water safety is experienced by individuals, by researching how water awareness, water related behaviour and the Limburgian landscape of water safety are related to one another.*

In order to reach the research objectives the Meuse-Island was chosen as a case for studying water awareness, behaviour and the Limburgian landscape of water safety. As this piece of land is enclosed by water, it provides an interesting setting for studying how water safety is experienced by people living on the island. Like other Meuse-villages, the river has been playing a major role from different points of view. Next to prosperity which is bought by the river, the people from Stevol (*Stevensweert and Qhé en Laak, villages in the Meuse-Island*) experienced quite some discomforts over the past centuries. In order to obtain data on the different topics of interest, multiple methods were used. First, 16 people from the Meuse-Island were interviewed in order to study how water safety and the Limburgian landscape is experienced by people from the Meuse-Island. Secondly, an area walk and group discussion was done in order to guarantee triangulation and obtain a better understanding on how people behave regarding water safety. Thirdly, perspectives of inhabitants which were submitted in the context of water safety projects were analysed to better understand how risks and water policies are experienced by people from Stevol. Fourth historical sources were analysed in order to understand how the water awareness and related behaviour developed over the years. Last, 10 experts and officials of water authorities in Limburg were interviewed to better understand the link between the Limburgian landscape of water safety and water awareness on the Meuse-Island.

As the analysis of the data sources appointed above indicate, water awareness on the Meuse-Island is strongly influenced by physical and geo-political characteristics in South- and Central- Limburg. Water on the Meuse-Island was perceived as both, a friend and an enemy. Whereas fertile grounds and a strategic location were provided by the river on the positive side, great inconveniences were experienced when the island was flooded by the Meuse. From a physical point of view, the contemporary believe of many people on the Meuse-Island that a flood cannot result in casualties is very important. Since the risks of living close to the Meuse are perceived as very low by most of the people from Stevol, people tend to focus on the promotion of opportunities, rather than focusing on the prevention of threats. Another important factor in the limited focus on preventive measures by the people from the Meuse-Island is the sharply increased focus of water safety projects on the prevention of floods. As the authorities strongly focus on preventing Limburg from floods, people are less inclined to perform preventive measures themselves. Next to the results of measures to prevent Limburg from floods, the relatively short history of Limburg with flood defences seems to be influential too. Whereas the status of dikes and other flood defences are uncontested in many places, many water defences in the Meuse-Valley are relatively new and do not have this uncontested status yet.

Even though a clear link between water awareness and water related behaviour is often assumed, it can be argued that a higher awareness on the flood risks on the Meuse-Island does not necessarily lead to a stronger focus on preventive measures by people from Stevol. Yet, a link between the awareness of water safety matters and water related behaviour can certainly be made. Experiences with water strongly influence the individuals' awareness on water safety matters which might result in different kinds of water related behaviour. As argued in this study, experience regarding water safety is very important for people in order to develop a risk perception and deciding whether or not to perform preventive measures. Since the last experiences regarding water safety for most of the people on the Meuse-Island dates back to 1993 and 1995, the propensity of individuals to perform preventive measures has diminished. The longer it has been since the last water safety related experience, the less people are inclined to perform preventive measures. Nevertheless, experiences with water safety are not always related to the floods of 1993 and 1995. For example a marina administrator whose marina gets flooded regularly elucidates that recent experiences regarding water safety still influence the preventive measures taken by individuals. Yet, preventive measures of individuals cannot be expected when perspectives on the consequences of behaviour are missing. As people hardly experience the consequences of preventive measures regarding water safety, the awareness of people that they can contribute to their own water safety diminishes. However, it should be remarked that water awareness and related behaviour is very personal. Whereas some people want to exclude all kinds of risks, others are more inclined to promote water related opportunities.

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# 1 INTRODUCTION: LIMBURG, FLOODS AND WATER AWARENESS

*'Sinister and unaccustomed. That is how the weather around Christmas 1993 is described. From early December it rains incessantly. Strong winds, cold and stormy weather and even more rain. Belgium raises the alarm. The BRT-journal of Sunday the 19<sup>th</sup> of December presents images of raging waters of the river Meuse and its tributaries.'* (Provincie Limburg, 2013, p. 10)



Notwithstanding the threats that are described above, people in the province of Limburg do not seem to be very concerned. 'The advent of the river Meuse is about a part of the annual agenda in the villages of Borgharen and Itteren' (Provincie Limburg, 2013, p. 10). However, many people in Limburg (*Limburgers*) started to realize that the water would reach its highest level in the 20<sup>th</sup> century. More than 12,300 Limburgers had to leave their houses as a result of the rising water levels around the Meuse and its tributaries around Christmas 1993. In a short timeslot almost 46,000 acres of land is inundated. Many people in the Netherlands are reminded that water safety is never guaranteed. The Dutch history of fighting against-, and living with-, water was emphasized once more.

After the flood of 1993, Limburg is shocked by another flood in early 1995. Even though the eventual impact is limited in comparison with the events in 1993, the importance of water safety on the agenda of Limburg seems to be clearer than ever before. The shocking events of 1993 and 1995 boosted the awareness on risks that the Meuse can entail. As a result of shocking events like the floods of 1993 and 1995, room for policy changes concerning water safety in the province of Limburg emerges (Johnson, Tunstall, & Penning-Rowse, 2005). To protect Limburg from new floods in the short-term, emergency levees (*noodkades*) have been built in 1996. These levees are protecting the province at a protection of 1/50 year. This means that a flood is expected to happen once in each fifty years. Due to river-broadening and river-deepening projects, it was expected that the levees would protect the Limburgers with a protection level of 1/250 (Sanders, Creemers, & Driessen, 2011, p. 4).

## 1.1. LIMBURG AND WATER SAFETY

The history of the Netherlands on water management is renowned worldwide. Yet, the province of Limburg has its own and somehow divergent history. Practices of depolderisation (*ontpoldering*) for example are not a part of the Limburgian history. 'The feeling of always living with- and fighting against- water is less present in Limburg than in other places in the Netherlands' (Duisings, personal communication, February 12, 2015). In contrast to other rivers, only a few levees around the river Meuse have been constructed before the floods (Renes, 1995). Even though the floods of 1993 and 1995 are seen as driving forces behind the construction of (emergency) levees in Limburg, the debate on water safety in Limburg was ongoing before the floods. In this section a brief glimpse on Limburg and water safety will be outlined in order to better understand the present development concerning water safety in the province.

At the installation of the first Lubbers ministry in 1982, conformity was reached on the enhancement of river embankments. By 1998 all river embankments had to be at sufficient strength (Van Heezik, 2007). In order to reach this target the first Boertien committee was appointed. The assignment for

this commission was to review the basic principles used at dike reinforcements critically (Van den Brink, 2009). In its report the Boertien I concluded that significant changes have occurred since the advice of the commission Rivierdijken (Commission Levees) in 1977. According to the first Boertien committee, these changes provided a reason for changing the basic principles of dike reinforcements at several points (Van Heezik, 2007, pp. 233-234). Especially the advice to concentrate more on the relation between humans and their environment was a new move. Attention for nature and environment, which was fought for by environmental activist since the 1970s, was now acknowledged in the water security debate.

Even though the balance between human and nature was a central issue in the advice of the first Boertien committee, dike reinforcements were still seen by the committee as the best way to guarantee water security (Van Heezik, 2007). Yet, a more 'sophisticated' working method should be adopted. An obligatory environmental impact assessment (*Milieu Effect Rapportage*) should have a significant role in future dike reinforcements (Van Heezik, 2007, p. 234). The current Minister of Transport, Public works and Water Management (*Minister van Verkeer en Waterstaat*), Minister Maij-Weggen, had indicated that dike reinforcements needed to be finished as soon as possible. However, she was surprisingly positive about the report of the first Boertien committee and did no longer emphasize the pace in which the reinforcements should be finished. The House of Representatives (*Tweede Kamer*) also adopted the advice of Boertien I positively. The delay of water security projects did not seem to worry the parties concerned. Even though the new approach in which the role of nature was a bit more centralized, environmental activists doubted the eventual effects of this report on the civil service and executive agencies (Van Heezik, 2007).

'When no space is given to me, I will take care of that myself, is what river Meuse must have thought in December 1993' (Van Heezik, 2007, p. 237). Flooding and images of flooded villages had a big impression on people in Limburg and beyond. 'A flood in the Netherlands, the safest Delta of the world, is seen as big news in the international media' (Tonneijck, personal communication, January 19, 2015). The flood is a serious wake-up call for many people living around the river Meuse and beyond. After the flood the awareness of the risks that are involved in living close to the Meuse, is probably higher than ever before. 'The atmosphere after the report of the first Boertien committee overturned promptly' (Van Heezik, 2007, p. 237). Reinforcements of dikes were now the first priority and should be started directly. Activist groups like 'Dike reinforcements now!' (*Dijkversterking nu!*) and 'Foundation vital dike reinforcements' (*Stichting dijkverzwaring levensbelang*) arose. The House of Representatives established the 'Commissie watersnood Maas' (*Commission flooding Meuse*), the second Boertien committee (Boertien II), which was commissioned to identify the measures that should be taken to prevent the Meuse from flooding in the future. In contrast to Boertien I, Boertien II focused predominantly on spatial and environmental measures (Burgers, 2014). The construction of levees was seen as mean for closing the last gaps (Van Heezik, 2007, p. 238). According to Boertien II the most effective way to enhance water safety levels in Limburg was to give room to the river Meuse. The appreciation of spatial and natural measures is also reflected in the accompanying letter from the 'Commissie Watersnood Maas (1994):

*'During our proceedings we have been confronted with the tensions that arises when people want to live and work in the floodplain of a river. On the one hand the riverbanks provide an attractive opportunity for settlement: natural dynamics of the river Meuse are highly appreciated. On the other*

*hand people expect a high degree of manageability of extreme events. Floods, in their opinion, should not cause significant damage.'*

~~~~~

Six weeks after the publication of the report from 'Commissie Watersnood Maas', a new flood occurs in January 1995. Even though the physical impact is not as big as the flood of 1993, the public concern became stronger. Particularly because the flood of 1993 was no longer perceived as an incident. Within a week after the returning of the evacuees the Kok ministry decided on the 13<sup>th</sup> of January 1995 that the execution of dike reinforcements should be accelerated drastically (Van Heezik, 2007, p. 239). The emergency act 'Deltawet Grote Rivieren' (Delta Act major rivers) should make sure that 150 kilometres of levees along the non-embanked Meuse are finished no later than the end of 1996. In order to meet this deadline, procedures like the environmental impact assessment (*MER-procedure*) were simplified or bypassed. The flood of 1993 was no longer seen as an incident and measures should be taken to prevent people from higher discharges of the river Meuse.

Even though many measures have been undertaken since the floods of 1993 and 1995, the Commission Water Management 21<sup>st</sup> century claims that a shift in water safety policies is indispensable. According to the commission, the current system will not be able to respond to future developments properly. The majority of recommendations proposed by the Commission Water Management 21<sup>st</sup> century (2000) were adopted in the policy paper 'Anders omgaan met water' (*A different approach to water*). The term Room for the River plays a major role in this policy paper (Ministerie van Verkeer en Waterstaat, 2000). By giving more room to water the chance of calamities through floods can be reduced, nuisance due to heavy rains is limited and water is spared for dryer periods. 'The strategy of retention, storing and discharging' is a breach with the tradition of 'pumping and rapid discharge'. By adapting a new strategy, water managers in the Netherlands prevent the shifting of water problems (Van Eijsbergen, Poot, & Van de Geer, 2007). Examples of the new approach of retention, storing and discharging are the project of 'Room for the River' and 'Maaswerken'.

## 1.2. PROJECT FRAMEWORK

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In 2006 the Rijkswaterstaat, the policy-implementing arm of the Dutch Ministry of Transport, Public Works and Water Management, started the execution of the Maaswerken (*River Meuse projects*) in cooperation with the province of Limburg and the regional water boards. The new standards of 2005 that qualify the levees around the Meuse as primary flood defences were incorporated in the new project plans (Sanders, Creemers, & Driessen, 2011). The projects 'Zandmaas' (*Sand-Meuse*) and 'Grensmaas' (*Border-Meuse*) were started to enhance water safety levels in the provinces Limburg, Noord-Brabant and Gelderland. Broadening and deepening of the Meuse enhances both, water safety levels and navigability of the river. 'Reducing the flood probability and the extraction of gravel go hand in hand with the construction of hundreds acres of new nature. The Maaswerken provide for two flood channels in the north of Limburg and water retention areas around Roermond' (Van Eijsbergen, Poot, & Van de Geer, 2007, p. 19).

Even though the projects *Grensmaas* and *Zandmaas* improved the water safety levels significantly, the aimed protection level of 1/250 was not met by spring 2008. As a result of this 'protection gap' the Limburg water boards, 'Roer en Overmaas' and 'Peel en Maasvallei', indicated this gap at the

provincial level (Sanders, Creemers, & Driessen, 2011, p. 5). At the general consultation on the 3<sup>rd</sup> of June 2008 between the State Secretary for Transport, Public works and Water Management has pledged to start consultations with the water boards of Limburg in order to reach the aimed protection level of 1/250 (Sanders, Creemers, & Driessen, 2011, p. 5). This new project was called 'Sluitstukkaden' (*Closing the gaps*), which refers to the keystone position of the project. Even though much has already been done around the river Meuse over the past years, the 'Sluitstukkaden project' was seen as recognition of the importance of water safety in Limburg from the State (Provincie Limburg, 2013). According to many water managers in Limburg this has been a lengthy and laborious process. An example on how this process is experienced is given by the former governor Van Voorst tot Voorst (Provincie Limburg, 2013, pp. 34-35):

*'Over the past couple of years I had hoped that the water would flow just over the brink once more. Probably this will wake up the national government. The Meuse is a National river of which the State should bear responsibility. It's that simple.'*

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In order to meet the aimed protection level by 2020, a considerable number of dike rings should be improved. It is expected that this levees will not meet the aim of 1/250 after the broadening and deepening project of the river. In order to reach the aimed protection level, the water board Roer en Overmaas started structural reinforcement of levees along the river Meuse by 2013 (Waterschap Roer en Overmaas, 2014). In the project 'Sluitstukkaden', the whole region should meet the required protection level of 1/250. Various subprojects are identified on the basis of safety, preparatory time, land acquisition processes, execution time, feasibility and costs. In 2020, the subprojects together will protect people in the Meuse-Valley at a level of 1/250.

At the preparation phase of the Sluitstukkaden-project the tension appointed by the second Boertien committee (Commissie Watersnood Maas, 1994) still seems to be present: on the one hand riverbanks provide an attractive opportunity for settlement, on the other hand people expect a high degree of manageability of extreme events. Burgers (2014, p. 267) refers to this as 'the paradox of few extremes': *One designs for extremes – that occur very seldom – which raises a sense of security, which contributes to more unsafe behaviour of people.*

Next to the paradox of few extremes which is characteristic for riverine areas, regional particularities play a significant role in Limburg. The emergency levees that are constructed till 1996 are still the major flood defences in many parts of the south and the middle of Limburg. Partly as a result of the short term in which the emergency levees have been built and the less strict application of procedures involved, a unique river landscape in the Netherlands originated. Typically in this region are treed levees and constructions in the buffer zones of the flood defences. Sheds, houses and conduits are not uncommon in the river landscapes of the South and Central- Limburg (Tonneijck, personal communication, 19<sup>th</sup> of January 2015).

During the planning and design phase of 'Sluitstukkaden Maasdal', water managers involved are regularly confronted with particular cases asking for appropriate measures in order to reach the protection level of 1/250. People in Limburg seem to have become used to the unique characteristics of the landscape in the Meuse valley. Many houses that have been built before the floods of 1993 and 1995 are situated in the flood plains of the river. The previous mentioned 'paradox of few extremes' (Burgers, 2014) is seen as an explanation for unsafe constructions in flood plains of the Meuse: due to the very few extremes in the years before 1993 and 1995, a sense of security was



created. Attractive living conditions and the natural dynamics of the Meuse are experienced as very valuable for people living along the river. The risks involved in living in the flood plains of the Meuse are frequently not considered (Van Heezik, 2007). The awareness of risks seems to fade quickly after floods. For this reason a frequently used saying amongst water managers is: *'Give us this day our daily bread, and every ten years a flood'*.

It is most likely that the particular history of Limburg concerning water and the regional river landscape have their influence on how water is experienced in the region. Socio-cultural features and historical events affect the meaning people ascribe to water (Stronk, Hemsén, & Van Konijnenburg, 2003). Realization of water-related opportunities and threats is appointed by the term 'water awareness' (De Boer, Goosen, & Huitema, 2003; Ministerie van Verkeer en Waterstaat, 2007). Plausibly, the water awareness of people in the south and the middle of Limburg affects behaviour of people related to water safety issues in the region. An understanding of the water awareness of people living in the Meuse valley can contribute to the design of solutions for the benefit of water safety in the region. The more public-oriented approach which is adopted by many policy makers over the past years strengthens the importance of knowledge on how for example water safety is experienced by the public. Knowledge on a probable gap between the public and policymakers can contribute to solutions in which the interests of both parties are incorporated (Stronk, Hemsén, & Van Konijnenburg, 2003, p. 8). Potential conflicts of interests can be avoided by mapping the positions of different stakeholders at an early stage.

### 1.3. STUDY AREA: SOUTH- AND CENTRAL LIMBURG

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This study concentrates on the region of the water board Roer en Overmaas. This water board administers flood defences in the South and the middle of Limburg. The region of Roer en Overmaas is confined by the national frontiers with Belgium and Germany in the west, south and east. In the north, the administrative area of the water board stops after the city of Roermond. In Figure 1, the administrative areas of the 27 Dutch water boards are shown. Water board Roer en Overmaas is numbered as 26 on this Figure.

The river Meuse is the major stream in the management areas of Roer en Overmaas. Since the discharge of the river is largely caused by rain, discharges and resulting water levels of the Meuse can vary widely. The river Meuse originates in the northwest of France and crosses the French Ardennes before entering Belgium. Through great differences in height in the Belgian and French Ardennes, the water of the Meuse enters southern Limburg with great speed at the village of Eijsden. After Maastricht, the Meuse forms the border between Belgian Limburg and Dutch Limburg. For this reason, the Meuse after Maastricht is called the Grensmaas (*Border-Meuse*). From Maasbracht, the Meuse flows inland in direction of Roermond. Due to gravel deposits large Maasplassen (*Meuse Lakes*) originated in the region. Next to the extraction of gravel, the new Maasplassen formed hundreds of acres of new nature which contributed to many new tourists facilities south of Roermond. After Roermond, the Meuse flows in direction of Venlo and enters the administrative territory of the bordering water board, Peel en Maasvallei (water board no. 25 on Figure 1). From Venlo the River Meuse passes Den-Bosch and continues in western direction through the Bergsche Maas and the Amer. Eventually the Amer estuaries in Hollandsch Diep, an inlet of the North Sea.

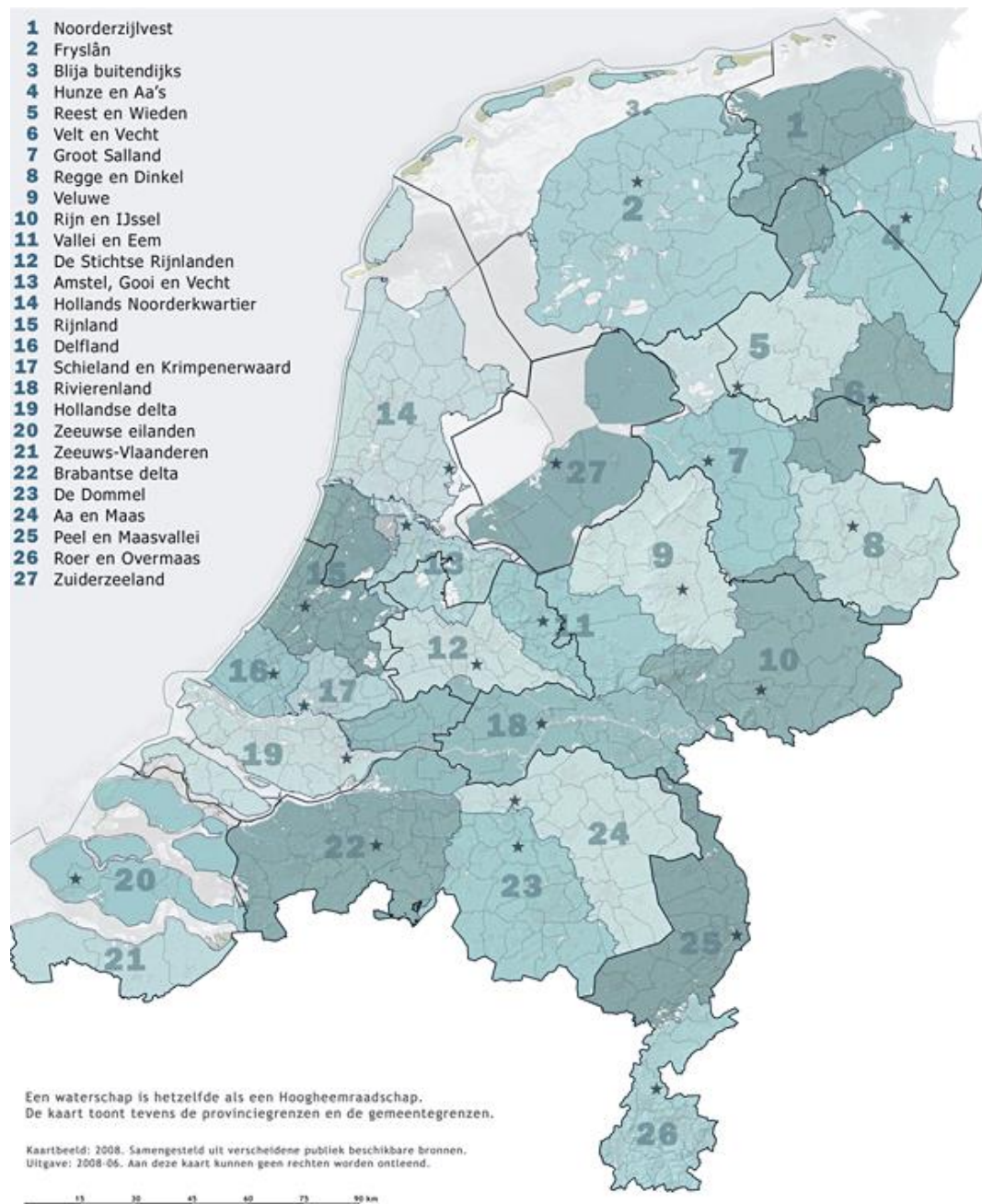


Figure 1: The 27 Dutch water boards (Waterschappen.nl)

As the projects *Grensmaas* and *Zandmaas* do not provide a flood risk of 1/250 in all places along the Meuse River, consultations with the water boards of Limburg were started in 2008 (Sanders, Creemers, & Driessen, 2011, p. 5). In 2010, the water board Roer en Overmaas signed an agreement with Rijkswaterstaat to for the project '*Sluitstukkaden*'. A budget of 23 million euro's was allocated to fund the measures for the levees in South and Central Limburg. In order to meet a protection level of 1/250 along the river Meuse in South and Central Limburg, six subprojects in the management area of water board Roer en Overmaas are defined. The six clusters (A to F) which do not meet the security standards are situated between Eijsden in the south of Limburg and Roermond in the central Limburg. Between 2013 and 2020, appropriate measures for all clusters have to be designed and implemented. In most of the cases levees between Eijsden and Roermond have to be improved by: raising and widening of the dike, decreasing the dike slope and placing a sheet pile wall in the dike. In

the design phase, the most suitable measure for each dike section will be sought. In particular cases, customized dikes or other solutions will be designed. Particularly at sites where multiple solutions are available, the water board involves local residents, businesses and interested organizations in the development and selection of measures to be taken.

### 1.3.1. CASE: MEUSE-ISLAND

One of the subprojects identified in the project 'Sluitstukkaden Maasdal' is called cluster A. This cluster is chosen as the case for studying water awareness in South and Central Limburg. The physical borders of cluster A are similar to the so-called Meuse-Island which can be found around fifteen kilometres southwest of Roermond (Figure 2). The island is about 5 kilometres from South to North and 2,3 kilometres from East to West. The name of Meuse-Island is a result of the enclosure of the island by the Meuse that forms the border with Belgium on the Westside and by the Old Meuse and the Julianakanaal on the Eastside. Even though exact sources on the age of the island cannot be found, historical sources indicate that Ohé en Laak and Stevensweert were already located on an island during the Spanish occupation in the early 17<sup>th</sup> century (Rutten, personal communication, March 6, 2015). According to many inhabitants from the island, the long and specific history of the island has left its traces until today. Both, recent and historical developments influenced the island physically and non-physically. Some of these developments and characteristics will be further described in this subsection.

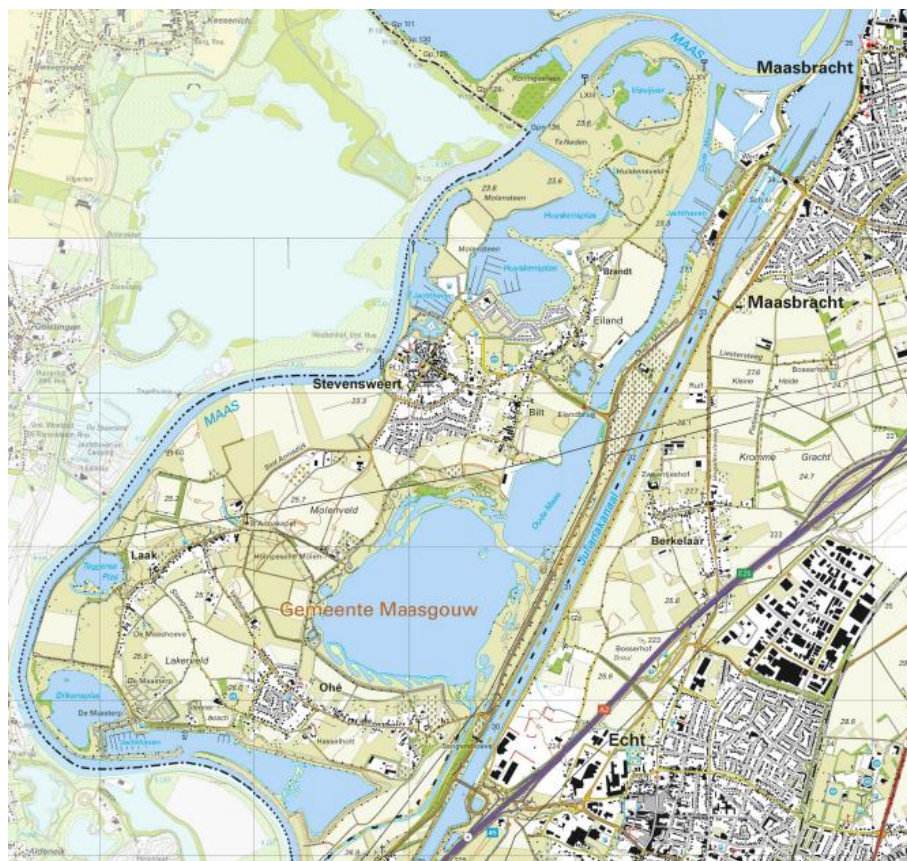


Figure 2: The Meuse-Island (Top25raster, Kadaster Apeldoorn)

The Meuse-Island consists of two small villages, Ohé en Laak and Stevensweert. Whereas Ohé en Laak consists of two merged villages which are typified by their ribbon development, the village of Stevensweert is typified by its geometric structure which dates back to its history as a fortress from



the 17<sup>th</sup> century. Popularly the villages together are called Stevol, which is derived from Stevensweert and Ohé en Laak. Together, around 2450 people are living on the Meuse-Island. From the age figures of the villages Ohé en Laak and Stevensweert, a rather skewed age structure can be found. Over 50% of the inhabitants from Stevol are older than 50 years (Gemeente Maasgouw, 2014). According to the population data from the CBS (Centraal Bureau voor de Statistiek, 2015), an increasing mean age in the municipality of Maasgouw can be found. It is very likely that Stevol can be typified by its ageing population too. According to Rutten (personal communication, March 6, 2015) young people often leave the island, while older people mostly stay or move to the island due to its appealing environment. However, processes of ageing and a shrinking population correspond to the regional developments (Latten & Musterd, 2009). Nevertheless it seems that the inhabitants of the Meuse-Island adapted to the changing economic, social and political circumstances. Partly due to the growth of the touristic sector, many inhabitants managed to find new ways of making a living as the agricultural activities on the island came under pressure as a result of large-scale gravel extractions.

During the Eighty Years' War, the Meuse-Island was seen as a strategic location by the Spaniards. From Stevensweert shipping between north and south could be blocked and controlled (Sangers & Simonis, 1955). As a result of the strategic location of Stevensweert the village was rebuilt into a fortress by 1633 (Figure 3). A system of canals, ramparts and ravelins was constructed to protect the fortress against the firepower of cannons. After constructing the canals and fortifications, an island on the Meuse-Island was developed. During the Eighty Years' War, the fortress of Stevensweert was attacked by State troops for several times. In the early 18<sup>th</sup> century the State troops of the Republic of the United Netherlands conquered the fortress. After being part of the empire of Napoleon from 1814 and Belgium after the Belgian revolt of 1830, Stevensweert and the Meuse-Island was allocated to the Netherland in 1839. Not long thereafter, Stevensweert lost its function as a strategic fortress along the river Meuse. Even though the canals have been filled after the fortress lost its function, the geometric structure in which the fortress was built still characterizes the village of Stevensweert.

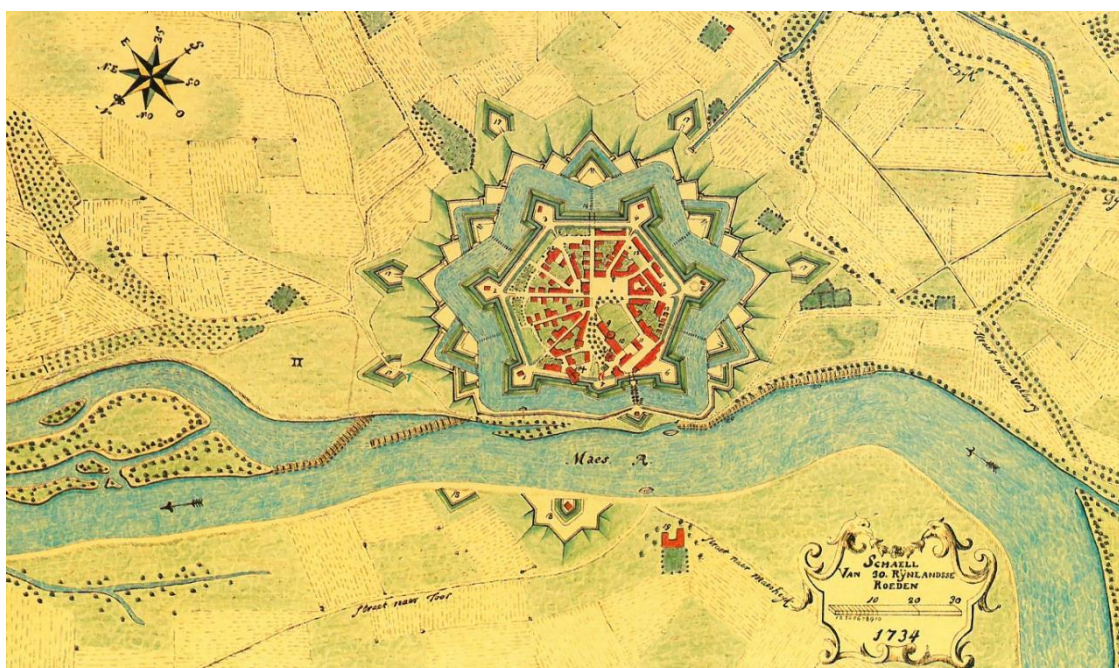


Figure 3: Historical map of the Fortress Stevensweert (Streekmuseum Eiland in de Maas)

Next to the strategic location from a historical point of view, the Meuse-Island is like many other locations in Limburg used for its presence of natural resources. Like other places in Limburg, the

landscape has changed significantly as a result of the gravel extractions (Rutten, 1993). For decades many dredgers have been working on the island in order to extract gravel from the island. Due to the extractions former agricultural land has been replaced by lakes. Since the extractions of gravel were combined with the development of nature, the island changed from an agricultural community towards a more tourist oriented community (Van Lankveld, personal communication, March 20, 2015). At the start, the proposed gravel extractions were welcomed with some resistance from the communities of Stevensweert and Ohé en Laak. Radical changes in the landscape combined with expected nuisances caused some existence from the communities. Nevertheless, many people now see the advantages of the gravel extractions. First, the extractions were an important source of income for many inhabitants of the island. Next to employment opportunities, the community was benefitting economically from the sponsoring of associations and high redemptions sums for agricultural lands. Secondly, the new landscape offered opportunities for tourist-related entrepreneurs to start or to grow their businesses. And thirdly, many inhabitants experience their new environment in a positive way as it offers a unique landscape (Service Check, 2014). Even though most of the inhabitants experience the new landscape positively the other side of the coin is that some of the farmers from the island were no longer able to practice their profession. Another negative side is having a more sentimental nature as some of inhabitants lost the emotional value they attributed to the landscape.

#### 1.4. RESEARCH OBJECTIVES AND QUESTIONS

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Following the argumentation of the project framework of Chapter 1.2, an understanding of the manner in which water is experienced by different people in South- and Central- Limburg can be useful for water managers in Limburg. As Chapter 2.1 will describe in detail, the challenge of being a technical expert in a democratizing world is getting stronger. As some of the experts in this study indicate, it is getting increasingly difficult for water authorities to implement new water safety measures. Due to very different perceptions on risks and how these risks should be dealt with by the technical expert and the civilian, issues may arise when new water safety measures and policies are designed. From these challenges for new water safety measures, it seems that the geo-political landscape of water management conflicts with the water awareness and water related behaviour of individuals. Whereas new measures are prioritized by water authorities, people living in river regions might have very different priorities. Following the foregoing argumentation, this research aims to contribute to future water safety policies that are in line with the ways in which water safety is experienced by individuals. The full objective of this study is shown in the figure below (Figure 4).

The aim of this study is to contribute to future water safety policies that are in line with the ways in which water safety is experienced by individuals,

By: researching how water awareness, water related behaviour and the Limburgian landscape of water safety are related to one another.

Figure 4: Research objectives

Following the research objective, the following key-question for this research is identified:

**Main question:** *How are water awareness, water related behaviour and the Limburgian water safety landscape related to one another on the Meuse-Island?*

In this study water awareness refers to the realization of the water related opportunities and threats. Especially the realization of flood related threats will be emphasized in this study in order to have a clear scope of research. Next to the main question, the three different sub-questions are shown below.

**Sub-question 1:** How do people on the Meuse-Island behave regarding water related threats?

**Sub-question 2:** How did the social-, physical- and geo-political landscape of water safety develop after the shock events of 1993 and 1995?

**Sub-question 3:** To what extent are people on the Meuse-Island aware of water related threats?

These three sub-questions are the three topics of study derived from the main question. In order to study how the water awareness, water related behaviour and the Limburgian landscape of water safety are related to one another, these three topics will be studied separately in the chapters 4 and 5. After answering the three sub-questions, the topics will be linked to one another in Chapter 6.

### 1.5. SCIENTIFIC AND SOCIETAL RELEVANCE

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In this section the scientific and societal relevance of this study will be indicated. As this case study is very close to practice, it is not very difficult to see how it is relevant from a societal point of view. Nevertheless, this study also researches some theoretical links of which a view could not be built on strong previous studies. In particular, the link between water awareness and water related behaviour is still a field of study which is not studied very extensively. An important reason for this somehow bleak link is the only recent interest in the concepts of water awareness and water behaviour. In the field of water management it is often believed that the link between higher degrees of water awareness automatically leads to a cooperative attitude and desired behaviour of local inhabitants. An example of a definition that assumes a positive relation is coming from the field of environmental awareness (Zelezny & Schultz, 2000) in which environmental awareness is defined as: *'specific psychological factors related to individuals' propensity to engage in pro-environmental behaviours'*. In this study, the often assumed positive relation between water awareness and water related behaviour will be studied critically. By adopting an open approach important factors that influence water related behaviour and awareness of individuals can be found. One of the highlighted factors in this study is the influence of the geo-political landscape. As this study will show, the geo-political landscape and its ensuing policies cannot be seen apart from how people experience water and how they behave regarding water. From this perspective, policies on water safety in the Netherlands and Limburg in particular can be studied critically. Next to the pragmatic questions on how water awareness is influenced by the geo-political landscape, more fundamental questions on the importance of covered water safety projects and the need to enhance water awareness in the Netherlands can be asked.

From a societal point of view, the relevance of this study can be found on the scale of South- and Central- Limburg in the first place. A better insight in how water is experienced by different people in the region and how it relates to their behaviour can contribute to the future policies of the regional water authorities. More practically this study can contribute to a better mutual understanding between the regional water manager and the local civilian and entrepreneur. A better understanding



in how water is experienced can prevent miscommunications between the engineer and the local inhabitant. Furthermore this better understanding can contribute to the risk communication of the water board 'Waterschap Roer en Overmaas' and the future water board 'Waterschap Limburg'. Also the relevance for future water projects may be found in this study. The challenge of being an engineer in a democratizing society is covered in this study which might be used by the water authorities in adjusting their working methods to modern societal developments.

## 1.6. READING GUIDE

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*Chapter 2:* Theories on the Dutch and Limburgian geo-political landscape and theories on awareness and water awareness have been collected in order to have a theoretical background on how water, threats and opportunities are experienced. Next to these insights, theoretical studies on environment and water related behaviour were combined to get an understanding on how awareness and behaviour are related. In order to make this link, the importance of the geo-political is acknowledged as its role is described in Chapter 2 too. The theoretical framework of Chapter 2 will conclude with a conceptual model of water awareness, water behaviour and the role of Limburgian landscape of water safety.

*Chapter 3:* After the theoretical framework, the methodological choices of this study are explained in Chapter 3. The choice for a case study and the implications for the research strategies will be described in this chapter. Furthermore the methods and sources: semi-structured household interviews; area walk and group discussion; submitted perspectives on levee reinforcements; historical data analysis and expert interviews will be motivated. This data and the applied strategies are an important part of the confrontation of the conceptual model with the Meuse-Island case and the data obtained by interviewing experts and water safety officials.

*Chapter 4 and 5:* The confrontation of the data with the theoretical concepts represented in the conceptual model of Chapter 2 will be done in Chapter 4 and 5. First, Chapter 4 will describe and analyse the water related behaviour and how this is related to provided action perspectives and the geo-political landscape. The sometimes ambiguous streams of investing in both, safety and enhancement of water awareness will be touched upon in this chapter as well. Subsequently, Chapter 5 will describe and analyse water awareness on the Meuse-Island. The role of the shock events of 1993 will be described and analysed and thereafter the three dimensions of water awareness: affection, cognition and aspiration will be described and analysed separately. Ultimately a description of the water awareness on the Meuse-Island will be given in the last section of this Chapter.

*Chapter 6:* Following the Chapters 4 and 5 in which the concepts of water awareness, water related behaviour and the Limburgian landscape of water safety are studied, Chapter 6 aims to link and analyse how these different concepts are related. First, the link between the Limburgian landscape and water awareness on the Meuse-Island will be made. Secondly the link between water awareness and water related behaviour will be analysed. Last, processes of feedback on behaviour will be analysed.

*Chapter 7 & 8:* Finally the results of the analyses will be repeated and listed in Chapter 7. After answering the research question, a short reflection on the research will be provided too. The gained knowledge will be used to provide some recommendations for policies and further studies.



## 2

## WATER AWARENESS: THEORIES AND CONCEPTS

*A delta with a lot of water is an attractive place for living, working and recreation. Yet, such a low-lying area also involves risks: absolute safety can never be guaranteed and water nuisances cannot be ruled out. It is the governments' task to make its people aware of these risks. Aware civilians can, in contribution to the authorities' efforts, contribute to the prevention of damage and nuisances. (Ministerie van Verkeer en Waterstaat, 2000)*



The previous quote which comes from the policy paper 'Approaching water differently' (*Anders omgaan met water*), emphasizes the importance of water awareness in modern approaches regarding water safety. Partly due to this policy paper, Rijkswaterstaat released a report in which the relevance of water awareness in future water policies was stressed. In a changing and increasingly democratizing society it is important to better understand how people relate to water safety and other water related matters. This chapter will provide a theoretical background in order to better understand the meaning and importance of the term water awareness and its relation water related behaviour and the Dutch geo-political landscape.

In the first section the geographical landscape of water management and the Dutch river management in particular, will be described. The opening up of Dutch water authorities and the current state of water management will be outlined in this section. Furthermore the role of shock events in the origination of windows of opportunity will be described. Finally, the role of risk communication and openness in the current geo-political landscape will be described in order to better understand its role in the constitution of water awareness. The second section will touch upon the three dimensions of water awareness: affection, cognition and aspiration. Theoretical insight in the role of these three dimensions of water awareness and how they interrelate will be provided in this section. The third section represents the step to practice. In this section the sometimes ambiguous relation between water awareness and water related behaviour will be provided with theoretical background. At last, the fourth section of this chapter will come up with a conceptual model in which the theories and their relations are shown on a schematic manner. This synthesis will be used as a basis of analysis in the ensuing chapters.

### 2.1. GEO-POLITICAL LANDSCAPE

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'For many years water managers in the Netherlands worked in a closed (and safe) realm of technical expertise on hydraulic engineering within the relatively autonomous policy domain of water management. For better or for worse, it seems that these times are over' (Wiering & Immink, 2006). According to different scholars on Dutch water management, a number of triggering events and social and political change resulted in a more open and communicative field of policy. This section aims to describe briefly what the geo-political landscape of water management looks like and how it has changed over the past decades. As this is a rather broad field, this subsection will mainly focus on the Dutch flood management of rivers. This description is important as it sets the background for the role of water awareness in the Dutch landscape of flood management.

The first subsection will give a description on how water policies developed over the past decades and on how shock events and windows of opportunity changed the field of water management in the Netherlands. The second section will discuss the role of shock events and how these events can

result in new policies. Finally the third subsection touch upon the role of integrated and communicative approaches in the Dutch water management.

#### *2.1.1. DUTCH RIVER MANAGEMENT FROM THE 1950s TO PRESENT*

According to Wiering and Arts (2006) 'the traditional discourse in Dutch water management reflects the history of the Netherlands fighting against the sea, storms and frequent flooding, losing land, building dikes, conquering land from the sea, embarking and cultivating it.' As this subsection will argue, some developments towards more integrated approaches have been made over the past few decades. However, Wiering and Arts (2006) argue that 'it is too early to speak of a deep institutional change in Dutch water management, particularly when its administrative organization and power structure has been taken into account'. Nevertheless some different discourses can be identified in the development of the Dutch water management after World War II. Based on different sources regarding water management in the Netherlands and Europe (Disco, 2002; Lintsen, 2002; Van der Brugge, Rotmans, & Loorbach, 2005; Johnson, Tunstall, & Penning-Rowse, 2005; Van den Brink, 2009), three periods will be described in this subsection: the technocratic period from the 1950s, the waves of change from the 1970s and the flood risk management approach from the 2000s. Even though the different scholars ascribe different names or exact dates to the different periods, similar developments are described by all of them.

The traditional technocratic discourse has been dominant for a long time. As Van den Brink (2009, p. 78) describes, 'water managers in the 1950s had a strong belief in their ability to shape the Dutch landscape through intelligent and perfect engineering design'. The technocratic system of meaning was also reflected in the hierarchical and semi-military organizational structure of Rijkswaterstaat, the policy-implementing arm of the Dutch ministry for infrastructure and environment (Van den Brink, 2009, p. 77). Yet, the river management in this period was highly overshadowed by the coastal works that resulted from the great flood disaster of 1953. According to Wiering and Arts (2006) 'dike enhancement was even more slowed down by protest and litigation from river landscape protectors and environmental agencies, who expressed a 'counter-movement' distrust in Dutch water authorities as well as the so-called Not In My Backyard (NIMBY)-effect among civilians'. In summary, the dominant rationale in the world of water managers was that humans have dominion over nature. Therefore land is seen for human use by the engineers in the period after World War II (Lintsen, 2002).

Even though the Dutch water managers experienced successful years after World War II in for example the Delta works, the Rijkswaterstaat was increasingly criticized from the 1970s by its unilateral technocratic approach (Van den Brink, 2009). A widely used example for the criticism on the Dutch water management is the Oosterschelde crisis. As a result of the flood disaster of 1953, large flood protection projects were designed by the engineers. Yet, societal developments like the rise of the environmentalism in the early 1970s put great pressure on infrastructural projects throughout Europe (Disco, 2002). Even though the influence of the environmentalists was limited initially, the demand for a more holistic approach could no longer be denied after years of lobbying and resistance by the environmentalists. In the case of the Oosterschelde, a semi permeable dam saved the day. Due to this semi permeable dam, the dam would let enough water through to preserve an ecologically and commercially viable tidal range, while the dam could be closed during storm surges. 'The ingenious compromise 'spared both the cabbage and the goat,' as the Dutch saying goes, and was widely touted as a political and technological triumph (Disco, 2002, p. 211).'

Whereas Van den Brink (2009) refers to the period after the 1970s as a 'waves of change' period, Van der Brugge et al. (2005) theorize this period as a 'transition period. According to Rotmans (2006), a

transition can be defined as ‘a continuous process of societal change, whereby the structure of society (or a subsystem of society) fundamentally changes and has the following characteristics:

- It concerns large scale technological, economical, ecological, socio-cultural and institutional developments that influence and reinforce each other;
- It is a long term process that covers at least one generation (25 years);
- There are interactions between different scale levels (niche, regime, landscape).’

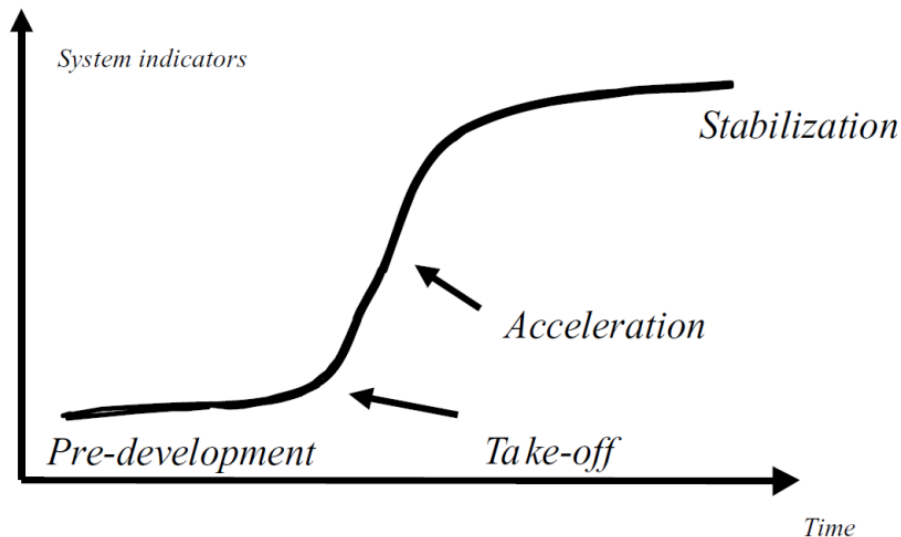


Figure 5: Transition model (Van der Brugge, Rotmans, & Loorbach, 2005)

Following the transition theory, four phases can be identified in a transition process: pre-development, take-off, acceleration and stabilization (Figure 5). Due to the interplay of numerous factors, a new status quo is reached after the completion of a transition. In the case of the Dutch water management, the penetration of biologists, public managers and spatial planners significantly changed the Dutch style of water management over the past few decades. Important events in the take-off and acceleration of the Dutch water management transition were the floods of the rivers Meuse and Rhine in 1993 and 1995 (Van der Brugge, Rotmans, & Loorbach, 2005). Even though it is argued that there was no catastrophic flooding in the end, ‘the shock events raised awareness that in the long term the Dutch would not be able to fight against the water with just higher dykes and better technical infrastructure. It was realized that too much land had been taken from the river and other water systems, and that the natural dynamics and water storage capacity of these systems had to be restored at least partly, to prevent future flood disasters’ (Meijerink, 2005, p. 1068). Partly due to the floods of 1993 and 1995, water managers agreed that a more adaptive water system was needed in order to anticipate future threats. The Committee ‘Water management for the 21st century’ (Commissie Waterbeheer 21e eeuw, 2000) claimed that ‘Dutch water management was not sufficiently prepared to meet the challenges of climate change effects in the next century’. In order to face the upcoming challenges, the Committee proposed a new water management strategy based on two starting points: (1) water had to be guiding in spatial planning, and (2) water had to be retained, stored and drained when necessary (Van der Brugge, Rotmans, & Loorbach, 2005). The new management principles of this so-called integrated water resource management (IRWM) are shown clearly in Figure 6.

Aspects of water management	1970's	2000
Problem perception	Singular	Interrelated
Management perspective	Problem solving	Anticipation
Scale	Local water problem	Water system structure,
Management style	Technological solutions	Spatial solutions
Strategy	Pumping, drainage, dikes	Retention, natural storage
Approach	Planning	Process
Competences	Disciplinary	Interdisciplinary
Staff	Engineers	Engineers, biologists, public managers, spatial planners
Institutional organization	Hierarchical, top down	Networks, participation

Figure 6: Differences in style of water management (Van der Brugge, Rotmans, & Loorbach, 2005)

Even though the landscape of water management in the Netherlands has changed significantly, some scholars argue that water is still managed in a rather technocratic way. Van Hemert (1999) for example argues that 'the new policy discourse more room for the river in the Netherlands is only an adaptation strategy of the Dutch Directorate-General of Transport and Water Management in order to maintain room for the engineer'. Even though Wiering and Arts (2006) doubt this conclusion by providing examples of institutional changes beyond discursive shifts, the challenge of being a 'technical expert in a democratic society' (Van den Brink, Rijkswaterstaat on the horns of a dilemma, 2009, p. 238) remains. As Abbott (1988) puts it, 'professions expand in the fashion of predators: domains neglected or poorly serviced become objects of contestation among vying professions and ultimately an object of conquest by one or more of them.' For this reason, the environmental assessment procedures are currently criticized by their focus on ecology. Social effects of infrastructural projects are overshadowed by extended and detailed ecological studies (Hartman, Bakker, & Woesthuis, 2014). A more human oriented approach seems to be desirable in order to maintain the legitimacy for infrastructural projects. Van den Brink (2009, p. 259) strikingly describes Rijkswaterstaat's dilemma which seems to apply for other water authorities as well.

*As Rijkswaterstaat has managed to successfully incorporate elements and practices of the environmental discourse and the neoliberal managerial discourse, the horns of the dilemma on which it is now caught in concrete water planning practices are its expert status on the one hand and the need to democratize on the other.*

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Another point of criticism on the Dutch water management system is its approach towards flood risks. This flood risk is often defined as the probability of a flood event multiplied by the potential impact of flooding. 'In the Netherlands the focus is almost entirely on reducing the probability of flooding. Flood preparedness and the need for good evacuation plans have only recently reached the Dutch governmental agenda' (Meijerink & Dicke, 2008, p. 505). Due to this somewhat unilateral approach the other layers in the flood risk management approach, sustainable spatial planning and disaster management (Kolen, Maaskant, & Hoss, 2010), are often neglected in the Dutch water policies. 'As the Dutch have invested mainly in reducing the probability of flooding, a lack of flood awareness is found amongst the Dutch population. This in turn makes it more difficult to change policies, and to switch to a path where the reduction of vulnerability and flood preparedness are placed more centrally in flood risk management' (Meijerink & Dicke, 2008). Following this argumentation of Meijerink and Dicke (2008) the efforts on enhancing the water awareness in the Netherlands seem to be somewhat contradictory. As the dominant strategy of flood risk



management is focusing on flood protection, democratization of water management and the involvement of non-political actors seems to be a somewhat unrealistic objective.

### *2.1.2. SHOCK EVENTS, POLICY WINDOWS AND POLICY ENTREPRENEURS*

Even though the previous section already lightly touched upon the role of shock events on the development of water management in the Netherlands, this subsection will discuss the role of shock events and subsequent windows of opportunity a bit more detailed. As Driesen and Leroy (2007, p. 39) argue, environmental policies both, in the Netherlands and internationally, consists of sequential reactions to crises. The important role of crises in the development is widely acknowledged in the world of water managers. This collective knowledge is shared in the well-known saying of water managers: 'Give us this day our daily bread, and once every ten years a flood disaster'. Following the argumentation of Johnson et al. (2005), the development of policy ideas, which are accelerated during shock events, appear to be dependent on the contexts that have gone before'. An interesting theory in assessing policy changes is the notion of Kingdon (1995) on policy windows. In this theory, streams of problems (and solutions), policies and politics come together at certain critical times. Policy windows can be opened by the appearance of compelling problems like a flood disaster or by events in the political realm.

The ability to predict future policy changes resulting from flood disasters is dependent on the knowledge of issues, actors and ideas seen as important before the flood (Johnson, Tunstall, & Penning-Rowsell, 2005). Environmental, behavioural and contextual drivers seem to be key factors in predicting future policy changes. However it takes a severe and damaging flood to place flooding on the political agenda, 'there is no guarantee that the nature of the policy issues raised by a major flood disaster will offer anything more than post-event response and recovery' (Johnson, Tunstall, & Penning-Rowsell, 2005). Even though a window of opportunity is often provided, new ideas do not necessarily materialize after a major flood disaster. The contexts that have gone before this shock event seems to be crucial in the development of new policies (Birkmann, et al., 2010). According to Johnson et al. (2005), 'the impact of major floods on policy change appears to be dependent on a combination of contextual, behavioural and environmental drivers. Factors of particular significance for determining the typology of possible policy responses have been found to be a combination of:

- the magnitude of the flood disaster, and its impact (environmental drivers);
- the availability of technology, knowledge and information at the time of the flood (contextual drivers);
- the socio-economic, political and governance structures in place (contextual drivers);
- the dominant attitudes, beliefs and values of society towards the flood hazard (behavioural drivers).'

Another notion in the field of future policy change is the policy entrepreneur (Huiteima & Meijerink, 2010; Meijerink & Huiteima, 2010). Policy entrepreneurs can be defined as 'people willing to invest their resources in return for future policies they favour'. An interesting implication in the notion of policy entrepreneurs is that a policy entrepreneur is not necessarily a governmental body. Also individuals, groups of people and non-political organizations have the opportunity to open or to close windows of opportunity and thereby direct policy change (Huiteima & Meijerink, 2010). The following five strategies can be applied by the policy entrepreneur in order to affect transitions (Huiteima & Meijerink, 2010): developing new ideas; building coalitions and selling ideas; recognizing and exploiting windows of opportunity; recognizing, exploiting, creating, and/or manipulating the multiple venues in modern societies; orchestrating and managing networks. Yet, according to Van den Brink et al. (2014) the Dutch planning institutions have a lack of entrepreneurial leadership. Due

to this gap of entrepreneurial leadership, a gap between policy making and policy implementation is observed in this study. As they (Van den Brink, Meijerink, Termeer, & Gupta, 2014) argue, planning institutions are highly path-dependent and more flexibility should be incorporated in order stimulate the capacity of actors to improvise. This lack openness and flexibility might be a good explanation for the limited involvement of private actors in the field of water management in Limburg (Tonneijck, personal communication, January 19, 2015)

### 2.1.3. COMMUNICATION IN THE DUTCH WATER MANAGEMENT

*The deliberate involvement of new actors, for example environmental organizations, can result in the dismantling of former closed strongholds like water boards. As a result, new ideas that had no viability before originate (Driessen & Leroy, 2007, p. 173).*

Even though it is increasingly recognized that a higher degree of involvement of new actors can contribute in people's confidence in the authorities, administrators tend to adopt a restrained attitude as they believe 'one should not wake sleeping dogs' (Van Winsum-Westra, Buijs, & de Groot, 2010). Moreover, the effects of a progressive attitude towards risk communication and openness can often not be observed in the short term. For those reasons, the propensity to adopt a somewhat conservative attitude in the interaction with non-political actors in spatial developments is clearly tangible in numerous cases (Baan, Gutteling, & Terpstra, 2008). Yet from both perspectives, the perspective of the administrator and the perspective of the non-political actor, different needs as well as advantages and disadvantages can be found. Probably the most important annotation is the understanding that the standards used for determining risks diverge significantly (Leiss, 2004; Driessen & Leroy, 2007; Terpstra, 2008). As an example, Driessen and Leroy (2007, pp. 38-39) argue that the risk analysis of an engineer can be completely different from a risk analysis by a civilian. The transition in the Dutch water management also led to a more communicative attitude of the water authorities. According to the different phases identified by Leiss (2004), the focus of risk communication shifted from convincing people to taking into account the social context and reaching consensus. Interaction is now the keyword in risk communication.

From the perspective of the civilian different reasons for both, interest and indifference can be found. In general civilians and other actors involved are more in need of risk communication in case of major uncertainties (Helsloot & Van 't Padje, 2011). When risks are rapidly growing, people expect the government to communicate actively about the resulting consequences. As for example climate change involves higher flood risks, a higher demand for risk communication can be expected (Helsloot & Van 't Padje, 2011). Next to a change in risk, a correlation between the factual risk and the demand for risk communication is found too (Sjöberg, 2000). The higher the risk, the more people are inclined to show information-seeking behaviour. Yet, as mentioned before, the perception of risks by civilians might very well be completely different from the risk perception of an engineer. One of the reasons for a low demand of risk communication by civilians is the relatively high trust in the authorities (Van Winsum-Westra, Buijs, & de Groot, 2010). Due to this high level of trust, people are not very interested in communication of risks by the authorities. Yet, this trust in the authorities is the lowest in Limburg in contrast to other Dutch provinces (Centraal Bureau voor de Statistiek, 2015).

Even though some good reasons for open and comprehensive risk communication were found, some pitfalls can be found on the road to effective risk communication. Most important in risk communication is providing a realistic impression of the risk with a clear action perspective for the

recipients (Baan, Gutteling & Terpstra, 2008). Yet, some contradictions can be found in the desired sense of responsibility and the policies of the water authorities. Investment in the reduction of the flood probability enhances the trust of people in the water related authorities. On the downside the reduction makes people feel more dependent on measures by the government, resulting in a more passive attitude and a descending sense of responsibility. By choosing a strategy, the degree of own responsibility for the authorities and the degree of responsibility is determined. Meijerink and Dicke (2008) describe this as the public-private division in flood risk management. Yet, an important question on how to enhance the civilians' water awareness remains (Terpstra, 2011): 'How is public communication on the structural investment in flood defences legitimated while civilians' risk awareness and self-help is stimulated simultaneously?'

## *2.2. AWARENESS: AFFECTION, COGNITION AND ASPIRATION*

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This section aims to explore the meaning of the concept water awareness. As awareness is a psychological term, psychological insights will be described in this section. In order to incorporate the spatial dimension, also geographical-, sociological and public administration theories will be used to come up with a definition for water awareness and water related behaviour. These insights will be used to conceptualize water awareness, water related behaviour and the role of the geo-political environment in the final section of this chapter (Chapter 2.4).

Awareness in psychology is seen as the link between people and their environment. Awareness provides someone with the realization of 'the existence of something' (Stronk, Hemsén, & Van Konijnenburg, 2003). Because of this realization, awareness is seen as a phase in the human action process: people are getting aware of a threat or an opportunity. 'As a result an individual feels that something should be done which in turn results in a problem perception. Only after a problem perception an individual is able to get a deeper grip on matters and search for the required solutions' (De Boer, Goosen, & Huitema, 2003, p. 5). Even though many theories from psychology on awareness can be found, roughly two forms of situational awareness are distinguished. Whereas the first form concerns the promotion of opportunities, the second form concerns the prevention of threats. The promotion of opportunities aims at the extent to which an individual focuses on positive development and subsequent chances for human and environment. The prevention of threats aims at the extent to which one focuses on preventing negative events like floods (De Boer, Goosen, & Huitema, 2003).

In literature, three dimensions are distinguished which in conjunction constitute ones awareness. These dimensions are mostly named as affect (feeling), cognition (knowing) and aspiration (willing). These three dimensions of awareness are often displayed in a triangle in which the three dimensions of awareness all have reciprocal relations (De Boer, Goosen, & Huitema, 2003; Ministerie van Verkeer en Waterstaat, 2007; Sánchez & Lafuente, 2010). In Figure 7 the dimensions and their reciprocal relations are schematically shown. In the following subsections, the dimensions and their theoretical background will be discussed separately. By providing insight in the psychological background of awareness and how it is constituted, a link between awareness and practice can be made in the next section (2.3). Furthermore, the conceptual relation between water awareness, water related behaviour and the geo-political landscape can be made in the last section of this chapter (2.4).

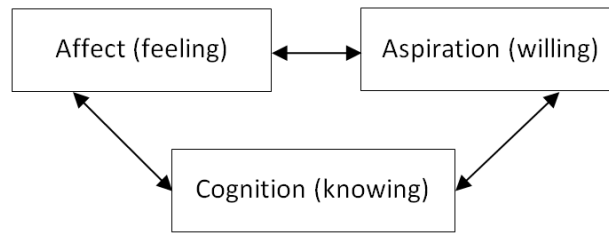


Figure 7: Three dimensions of water awareness

### 2.2.1. AFFECT

The affective dimension refers to the meaning someone attributes for or example water. ‘Different individuals experience an object or the environment in a variety of ways’ (Stronk, Hemsén, & Van Konijnenburg, 2003). According to Stronk et al. (2003), an individual is never able to observe its environment in a fully objective way. Each individual attributes its own meanings to stimuli from the environment. Personal characteristics contribute to a different set of meanings that one can ascribe to his or her environment (Sánchez & Lafuente, 2010). Next to the personal characteristics, the perspective from which the environment is observed plays an important role. A holidaymaker and a local entrepreneur for example will ascribe a very different meanings to the same environment. The perspective and the personal characteristics are also important in the estimation of risks. Whereas one individual feels unsafe in relation to floods, an other individual might experience the same situation as totally safe. A good example of a very particular water related sense of security is given by Jan van den Bergh, an owner of a dike house along the Meuse River (Van Wijk, 2001):

*Whilst local residents were massively looking for a safe haven during the flood of 1995, some of the residents did not feel the need to participate in the evacuations: ‘I perceived the mayors’ call for evacuation mainly as an advice’ is the laconic answer of Jan van den Bergh when he was asked why he refused to participate in the evacuations in 1995.*

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This quote is an interesting example of the wide variations in how water safety is experienced by different people. Whereas many people choose to participate in the evacuations, probably as a result of a serious perception of the call for evacuation, some choose not to follow up the evacuation appeals and did not feel the urge to leave their houses. According to Terpstra (2011) three reasons for untroubled feeling can be found. First, a lack of personal experiences can contribute to a low perception of risks. As one never experienced a flood, one does not have any references on how it feels to experience a flood. A threat which is never perceived as realistic does hardly influence ones affective dimension (Stronk, Hemsén, & Van Konijnenburg, 2003). Secondly people in the Dutch context have a great trust in the authorities and their ability to prevent them from floods. Due to this high degree of trust, people tend to feel safe and hence their preventive awariness is not so much challenged. Thridly, people tend to underestimate the risks they are exposed to. Their cognitive dissonantion is solved by whittling away the risk they are exposed to. This process will be described a bit further in the subsection ‘cognition’ (2.2.2).

Even though people in Limburg experienced acute threats in 1993 and 1995, studies have shown that these kinds of shock events do not necessarily result in feelings of unsaftey, fear and insecurity (Terpstra, 2011). Experiences with floods in 1993 and 1995 can also result in lower risk perceptions. Possitive associations like solidarity and excitement can contribute to the possitive memories of people regarding shock events. As some people are mainly focused on the promotion of chances, they primarly remember the possitive associations and forget about the threat they were exposed

to. On the other hand negative associations like fear and damages can contribute to feelings of unsafety, fear and insecurity. A higher perception of risks one is exposed to is often following from this negative experiences (De Boer, Goosen, & Huitema, 2003). From this study of the psychological effects of the floods of 1993 and 1995 it is again confirmed that the affective dimension is very personal and varies with each individual.

### 2.2.2. COGNITION

Next to the affective dimension, the cognitive dimension has its role in the constitution of the individuals' awareness. From the previously cited view of Jan van den Bergh, it becomes clear that attitude towards water safety is not only based on personal feelings. As Jan van den Bergh later in the same interview indicates, he had more reasons than only the absence of fear. Another reason for not packing his bags is the knowledge that Mister Van den Bergh has gained during the flood of 1993: *'At Christmas 1993, the water level was even higher than the water level in January 1995. At that time, the high water levels were not problematized at all'*. As this quote indicates, Mister Van den Bergh applied his knowledge he gained during the flood of 1993 to estimate the risk he was exposed to in 1995. Following his own cognitive considerations, Mister van den Bergh decided not to participate in the evacuations. This relation between learning by experience and future behaviour does not seem to be a curiosity as Van den Bergh was not the only one who stayed at home. On the other hand, many people who also experienced the 1993 flood decided to participate in the evacuations. Other considerations and probably also other cognitive risk estimations were made by this group.

The cognitive dimensions represents the extent to which an individual possesses knowledge and information about an object or the environment (De Boer & Huitema, 2003). In the context of risks that people are exposed to, Heems and Kothuis (2012) express this as a three 'cognitive fear'. Cognitive fear can be defined as a rational progressive force. 'As a result of the cognitive fear, the critical and rational question on the degree of manageability and control of extreme events arises.' In the practice of water safety, an individual or a group of individuals can ask themselves questions on the ability of levee reinforcements to guarantee absolute safety for the people living behind the levees. By asking questions on control and manageability, cognitive fear can contribute to a better awareness of vulnerability. Heems and Kothuis (2012) describe this cognitive fear as something positive: 'The idea that people should liberate themselves from all kinds of fear is unrealistic and undesirable from a vulnerability perspective. Cognitive fear is a rather important tool in the individuals' dealing with difficulties.'

### 2.2.3. ASPIRATION

The aspiration dimension of awareness represents the will and one's attitude towards different forms of behaviour. As described at the start of this section, (water) awareness is often divided in the categories prevention-oriented behaviour and promotion oriented behaviour. In the framework of water safety, especially the prevention-oriented awareness is of interest. People who are inclined to behave carefully will spend more time on trying to exclude dangerous situations and on the prevention of mistakes (Ministerie van Verkeer en Waterstaat, 2007). The higher the extent of prevention-orientedness, the more an individual will invest time in activities to prevent themselves from negative experiences like floods (De Boer, Goosen, & Huitema, 2003).

Similar to the affective and the cognitive dimension, the dimension of aspiration can be very different from person to person (De Boer & Huitema, 2003). Whereas one individual is putting lots of

effort in the prevention of different kinds of risks, other individuals are not inclined to invest in the prevention of risks at all. In this respect, a relation with the promotion-oriented awareness can be made. As some people are focusing mainly on the promotion of opportunities, the prevention of risks often remains underexposed. Yet, this link is also found the other way around (De Boer, Goosen, & Huitema, 2003). People who are fully focusing on the prevention of risks are mostly less alive to see and promote opportunities. Following this argumentation, it becomes clear that a good or a bad strategy cannot simply be defined. A middle course in which people are receptive for both, the prevention of risks and the promotion of opportunities, seems to be most valuable (Heems & Kothuis, 2012).

Even though a strong coherency between the willingness of an individual to show particular behaviour and the actual behaviour of the same individual would be very plausible, multiple sources of literature suggest that this link is not as straightforward as one might expect (Ajzen, 1991; Schlegelmilch, Bohlen, & Diamantopoulos, 1996; De Boer, Goosen, & Huitema, 2003; Bočkarjova, Geurts, Oosterhaven, & Van der Veen, 2009; Heems & Kothuis, 2012). Ajzen (1991) argues in his 'Theory of planned behaviour' that the attitude of an individual explains or predicts his or hers behaviour to a limited extent. Next to the factors of affection and cognition, factors external to individuals play a very important role in understanding ones behaviour. In his theory Ajzen (1991) describes the external factors as 'subjective norm' and perceived behavioral control'. Even though the theories that try to explain the coherency between the individuals' attitude and the related behaviour come up with divergent explanations, it is widely supported that factors external to the individual play an important role in understanding the behaviour of an individual. A deeper theoretical background on the link between awareness and behaviour will be provided in the third section of this chapter (2.3).

#### *2.2.4. COHERENCE OF DIMENSIONS*

As the previous subsections argued, it is difficult to touch upon the different dimensions of water awareness separately. The three dimensions are interrelated and one can hardly avoid touching upon one dimension without sideways touching upon another dimension. In the example of Van den Bergh, it is shown that his choices are not fully based on one of the dimensions. Both, his knowledge gained from experience and his feeling towards water safety are important to understand why Van den Bergh did not participate in the evacuations of 1995. Due to this interconnectedness, the dimensions of awareness, affect, cognition and aspiration, have a mutual link (Figure 7). Another lesson is that the relation between the different dimensions is to some extent different for each individual. Whereas feelings of fear can lead a need for information and a changing attitude as a result of the cognitive fear which was touched upon in Section 2.2.2 (Heems & Kothuis, 2012), feelings of fear can also lead to no change as people feel forceless to respond to their new situation. In summary, similar conditions can be experienced very different from individual to individual. Unique combinations of the affective dimension, the cognitive dimension and the aspiration dimension influence can lead to different ways and degrees of (water) awareness (De Boer, Goosen, & Huitema, 2003). Moreover, a process of awareness is very different from simply following a roadmap. Whereas cognitive oriented individuals are very eager to look for information on the risks they are exposed to, affective oriented individuals might a bit more on their safety feelings and feel a need to be reassured when they do not feel safe. Next to these generalizations, many other ways and degrees of awareness can be outlined.



### 2.2.5. AWARENESS IN A WATER CONTEXT

The concept of water awareness is relatively new in literature. As described in Chapter 2.1 the changes in the geo-political landscape contributed to a more people-oriented approach of the Dutch water authorities. The growing interest in water awareness and water behaviour can be seen as a development that fits in the developments of the water sector over the past decades. In 2000, the term water awareness was introduced as an expression of the awareness of people regarding water and water safety in particular. In the policy paper ‘A new approach to water’ (Ministerie van Verkeer en Waterstaat, 2000), a first explanation of the importance of water awareness is provided.

*A delta with a lot of water is an attractive place for living, working and recreation. Yet, such a low-lying area also involves risks: absolute safety can never be guaranteed and water nuisances cannot be ruled out. It is the governments’ task to make its people aware of these risks. Aware civilians can, in contribution to the authorities’ efforts, contribute to the prevention of damage and nuisances.*

From the understanding that full protection from floods is impossible, the government perceives it as her task to make people aware of the risks that they are exposed to. A commonly used statement in this framework is that ‘the Dutch should learn again to live with water instead of only fight against water’ (Stronk, Hensen, & Van Konijnenburg, 2003). Last years, different studies were done in order to explore the meaning of water awareness and the potential role of the authorities in enhancing the water awareness (De Boer & Huitema, 2003; De Boer, Goosen, & Huitema, 2003; Stronk, Hensen, & Van Konijnenburg, 2003; Ministerie van Verkeer en Waterstaat, 2007). Following from the studies and reports, various government campaigns were set up in order to reach the objective of enhancing water awareness in the Netherlands. Examples of how the government tries to enhance the awareness amongst civilians are the campaigns ‘Think forward’ and ‘the Dutch live with water’ (Heems & Kothuis, 2012). Yet a crucial critique on the campaigns is that they often are somewhat ambiguous and that a clear action perspective for civilians is often missing (Heems & Kothuis, 2012). Due to this missing relevance for many people, the effects of the awareness campaigns is questioned.

In the studies from the 2000s, definitions of water awareness are mostly distracted from definitions related to environmental awareness. One of the definitions of environmental awareness is given by Zelezny and Schultz (2000). In their study, they define environmental awareness as: ‘*specific psychological factors related to individuals’ propensity to engage in pro-environmental behaviours*’. Remarkable in many studies on environmental awareness is the notion that awareness is often related to positive and admired behaviour. Similar to the definitions of environmental awareness, definitions of water awareness tend to relate water awareness to positive and admired behaviour too. Beatley and Manning (1997) acknowledge this, by providing an ideal picture of water awareness: ‘*the ideal picture of awareness is that people: feel attached to their environment, possess knowledge on corresponding ecological components and processes, and that they are inclined by themselves to treat their environment respectfully.*’ The three dimensions of awareness we touched upon earlier in this section clearly emerge from this ideal picture of situational awareness.

A more neutral definition on water awareeess is provided by the Ministry of Infrastructure and Public works (Ministerie van Verkeer en Waterstaat, 2007). In this study, water awareness is defined as ‘*the realization of the water related opportunities and threats*’. In opposition to the other definitions, this definition adopts a somewhat more neutral starting point. Furthermore this definition also allows us to touch upon both, promotion-oriented awareness and prevention-oriented awareness. Following the foregoing argumentation, this definition will be used as the guiding definition on water

awareness in this study. As mentioned before, it is crucial to understand that water awareness can be very different from individual to individual. Therefore it is hardly possible to simply speak of a degree of water awareness. The manner in which an individual is aware or not aware of water related opportunities and threats might provide even more profound knowledge. An interesting example is the comparison between a civilian and an engineer by Driesen and Leroy (2007, pp. 38-39):

*The simple multiplication of probability times consequence should be a simple tool to define the significance of an environmental matter. Yet, this approach did not solve the questions of urgency in a satisfactory way. First, because a discussion on the divergency of risks and the measures to apply arose. Second, mathematical calculations of risks do not lead to unequivocal answers as the risk approaches of engineers and local residents are very different.*

### 2.3. WATER AWARENESS AND WATER RELATED BEHAVIOUR

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*If men define situations as real, they are real in their consequences. (Thomas & Thomas, 1928)*

In this section, some insights in the link between awareness and behaviour will be made. As this section will argue, the role of governmental institutions is essential in order to understand behaviour of people regarding water safety. As the quote from the Thomas theorem indicates, a threat should be perceived as real by an individual in order to be taken seriously. In this perspective it is important to understand the so-called public-private divide (Meijerink & Dicke, 2008) in flood management. The more responsibility is taken by the public sector, the less responsibility will be taken by the private sector. *'The ideal picture of awareness is that people: feel attached to their environment, possess knowledge on corresponding ecological components and processes, and that they are inclined by themselves to treat their environment respectfully'* (Beatly & Manning, 1997). Unfortunately, the reality is that the connection between (water) awareness and conscious behaviour is much more problematic than this definition suggests. As different studies argue, water aware behaviour cannot simply be seen as an automatic reply to a high degree of water awareness (De Boer & Huitema, 2003; Bočkarjova, Geurts, Oosterhaven & Van der Veen, 2009; Van Winsum-Westra, Buijs & de Groot, 2010; Heems & Kothuis, 2012).

From a governance perspective, different reasons for openness and sharing responsibilities can be found. An open and communicative approach is acknowledged to contribute to visible and collective policies. A condition for this visibility and collectively is a certain degree of involvement of private actors (Meijerink & Dicke, 2008). The more open the government communicates, the better people are aware of the proceedings of the water manager, the risks they are exposed to and their own responsibility. Furthermore open communication can enhance the trust that people have in water authorities (Heems & Kothuis, 2012). A better understanding of the arguments used by a water authority for performing water safety measures can contribute to the cooperation of individuals in the policies of the authorities. Yet, this does not mean that a higher degree of openness automatically leads to a higher degree of acceptance. Due to a growing sense of agency, people may also tend to oppose strategies as they feel that their interests are threatened (Bočkarjova, Geurts, Oosterhaven, & Van der Veen, 2009). In summary, an open and communicative approach may be very valuable for water authorities when certain conditions are met. Most importantly, an open approach should go hand in hand with a degree of involvement of private actors. Open

communication without action perspectives does not seem to be worthwhile (Heems & Kothuis, 2012).

More practically, communication and involvement should not result in needless fear amongst civilians. Especially exaggerated risk images in media tend to instigate people's suspicion, resulting in a societal immunity with respect to the message (Sintubin, 2012, p. 14). In general people tend to think fatalistic quickly. As a consequence, civilians are inclined to have little faith in their own action perspective and a trivialisation or denial of the risk they are exposed to is created (Sintubin, 2012, p. 14). According to Baan et al. (2008), a similar process takes place when an action perspective in the risk communication is missing. In summary, risk communication should be realistic, clear and be able to indicate the personal relevance for civilians (Heems & Kothuis, 2012). When these conditions are met, the taking of responsibility by civilians can be expected (Terpstra, 2011). Therefore effective risk communication is directed to both: the risk awareness and the action perspective of civilians.

Next to the public-private divide, some other insights in behaviours of individuals were found. Classic theories like the public good game (Brandt, Hauert, & Sigmund, 2003), the social control hypotheses (Raub & Weesie, 1990) and the tragedy of the commons (Hardin, 1968) provide some insight in the relation between individual and collective behaviour. Even though these theories do not directly answer the question on how people behave regarding water safety, these studies do provide insight in individual and collective behaviours. All of these approaches agree to the notion that people are often inclined to choose for individual gains over collective gains. As the public good game argues, people also tend to choose for the most profit on the short run. Even when the effects of this choice might be less positive on the long run, people are inclined to maximize utility on the short run. In contrast to the public good game, the social control hypothesis assumes that individual behaviour is strongly influenced by the individuals' social network. This hypothesis assumes that people will engage in pro-environmental behaviours when prevailing norms and values force an individual to engage in certain types of behaviour. Non-environmental behaviour in this approach is punished with sanctions from the group like non-acceptation. Last, the tragedy of the commons aims to explain environmental depletion as a result individual advantages for these types of behaviour. As argued by the tragedy of the commons, individual choices by multiple individuals will result in collective loss for all. Even though the insights and hypotheses from the three approaches summarized above will not be tested in practice, it provides a background for better understanding individual behaviour and choices for individual purposes, rather than collective purposes. An example related to water safety is the non-cooperation of individuals in water safety projects. For some people, the individual gain of having a better view for example is more important than the collective gain of an enhanced degree of water safety.

## *2.4. CONCEPTUAL FRAMEWORK*

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In the previous sections, several insights and theories related to water awareness, behaviour and the geo-political landscape passed by. This section will come up with a conceptual framework in which the most important results of the literature study are shown schematically (Figure 8). As this model is based on the findings of this chapter, the explanation will refer to these theories, historical lessons and practical insights.

A central part in the model of Figure 8 is reserved for the three dimensions of water awareness which were described in the second section of this chapter. The three dimensions: affect, cognition and aspiration are shown in the oval left in the Figure 8. In conjunction, these three dimensions form the individuals' water awareness. As described in this chapter, the weight and the importance of the different dimensions of water awareness can be very personal. Personal experiences, but also

personal characteristics influence how the individuals' water awareness is constituted. Important notions in this respect are prevention-orientation and opportunity-orientation. This orientation is again very personal.

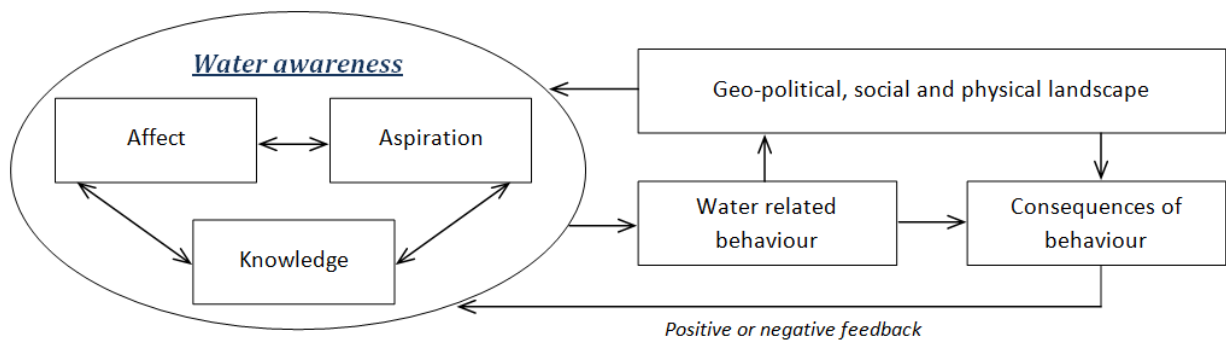


Figure 8: Conceptual model water awareness and water related behaviour

As elucidated in Section 2.3, water related behaviour cannot simply be seen as a result of water awareness. Important in this respect is the fact that behaviour of individuals is never fully isolated from the environment ones environment. Due to social control for example, people are inclined to adjust to their social network. Another lesson from 'the public good game' is that people are often inclined to choose for quick benefits. Even though this might not be the best choice in the long term, people are not always able to oversee their decisions. Furthermore, water related behaviour is done in a certain geo-political background. The space or no space provided to individuals for action will affect the behaviour of the individual. Furthermore it is argued in this chapter that a high prevention-orientation of the water authorities might lower the propensity of individuals to focus on preventive activities. The social, physical and geo-political influences can be found in the model as 'Geo-political, social and physical landscape'. Last, it is argued in this chapter that a feedback on behaviour of individuals can be assumed. This feedback influences how people perceive water awareness and is appointed in this model as 'Consequences of behaviour'. These consequences can be both, positive and negative. Whereas a positive feedback might lead to a positive perception of the individuals' behaviour, a negative feedback might do the opposite.

The model in Figure 8 has been leading in the development of the interview guide shown in Appendix I. Furthermore it has been leading in the preparation and the analysis of the other research methods which were used in this study (Chapter 3).

#### FURTHER READING

Following the theories and the subsequent conceptual framework presented in this chapter, the next chapter (3) will describe the research strategy, the sources of data and the strategy for analysis which were used in this study. After describing the methodological choices, Chapter 4 will analyse water related behaviour and the Limburgian landscape of water safety. Thereafter Chapter 5 will analyse how water safety is experienced on the Meuse-Island. By doing so, a link between the behaviour, the landscape of water safety and water awareness can be provided in Chapter 6. Last, the subsequent conclusions and recommendations for policies and further studies will be provided in Chapter 7 and 8.



# 3

## METHODOLOGY

*Two people can see the same thing, disagree, and yet both be right. It's not logical; it's psychological.*  
(Stephen R. Covey)

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As the previous chapters argued, the field of water awareness and its link to water related behaviour is studied since the 2000s. Due to the fact that we are dealing with a relatively young concept, the approach of this research can be typified as open and explorative. The most important advantage of this open and explorative approach is that the way in which the water awareness is created can be studied without lots of presumptions, which enables us to analyse how water awareness is constituted at the level of the individual. In this chapter the subsequent research strategies, methods, ways of data collection and strategies of analysis will be described. The first section will explain why a case study is useful to explore water awareness in South- and Central Limburg. Furthermore the added value of the expert study will be explained in relation to the case study. Moreover this section will describe the different methods used in order to obtain reliable data. Thereafter, the second section will discuss the strategies that are used to collect data. Finally, the third section will explain how the data is analysed and what these choices mean for the knowledge that is gained by this study. Furthermore this section will come up with a short reflection on the methods used in this study.

### 3.1. RESEARCH STRATEGY: SINGLE CASE STUDY

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As argued in Chapter 2, water awareness and its relation to the geopolitical landscape and water related behaviour cannot be considered as a simple one-to-one kind of relation. The dimensions affection, cognition and aspiration are very personal and do not allow us to predict how an individual will respond to a situation with full certainty. Therefore a social constructivist approach is the starting point for this study. Central in this approach is the understanding that there is much more than the physical reality in the world of the social scientists. The physical reality is rather seen as one of the motivations for perceptions, images and beliefs that are constituted in social interactions and in its turn steer other social interactions (Driessen & Leroy, 2007, pp. 38-39).

The most important strategy in this study which enables us to understand how water awareness and water related behaviour are related is the case study. The characteristics of a case study largely correspond with the knowledge that this study aims to provide. More specifically the chosen strategy is the so-called single case study. Verschuren and Doorewaard (2007, p. 187) describe this type of research as 'a profound study to a single observation unit'. The unit of observation in this study is the Meuse-Island (Figure 9) which is defined geographically which was done in Chapter 1.3.1. Following these characteristics of the Meuse-Island, it can be argued that people on the Meuse-Island have had some similar experiences with water as other inhabitants of the Meuse-Valley in South- and Central Limburg. Like other Meuse-villages, the river has been playing a major role from different points of view. Next to prosperity which is bought by the river, the people from Stevol also experienced quite some discomforts over the past centuries. In Chapter 4, this history with water will be described and analysed more comprehensively. Next to the similarities with other Meuse-villages, some singularities can be found on the island too. Probably the most important singularity is the fact that the Meuse-Island is fully surrounded by the river. Following the foregoing argumentations, the case of the Meuse-Island might provide us with some interesting understandings on water awareness and water related behaviour in South and Central Limburg. On the one hand, similar developments



strengthen the external validity of this study. Even though the magnitude is limited, understanding of water awareness and behaviour on the Meuse-Island might provide an understanding of water awareness and behaviour in other Meuse-Villages too. Furthermore the role of the Dutch and the local geo-political landscape might provide insight in geo-politics and water awareness in South- and Central- Limburg are related. Next to external lessons, singularities might provide a more profound understanding in how they influence the water related awareness and behaviour. Finally, the planned flood protection project described in Chapter 1.3 on the island can provide an interesting setting. The attitude and behaviour of people towards this project might help us to better understand the role of water safety in the daily lives of people on the Meuse-Island and probably beyond.



Figure 9: Case study area, Meuse-Island (Stroming, 2014)

As a result of choosing a case study, some resulting implications for this research are accepted. Yet, as these implications are in line with the knowledge we are looking for, it enriches the study and the subsequent results. Verschuren en Doorewaard (2007, p. 184) identify seven important features of a case study that have been leading in choices made regarding methods, data collection and strategies for analysis which are described in the next section (3.2).

1. a narrow domain, consisting of a limited number of research units;
2. a labour-intensive approach;
3. more depth than wide;
4. a strategic sampling method;
5. focus on context instead of separate variables;
6. open observations on site;
7. qualitative data and multiple research methods.

### 3.2. METHODS AND DATA COLLECTION STRATEGIES

After the choice for a case study, different methods were chosen with respect to the features of a case study described in the previous section. An important starting point in the selection of methods

was to ensure triangulation. This is done by choosing multiple research methods that provide us with different kinds of information. Furthermore, the qualitative approach of a case study is represented by the different methods that are described below. The process of collection data is mostly done on the Meuse-Island as it supports us in better understanding how the concepts described in Chapter 2 get alive on the island.

### *3.2.1. SEMI-STRUCTURED HOUSEHOLD INTERVIEWS*

The semi-structured household interviews are an important source of data in this research. By talking personally to people from the Meuse-Island, a better understanding on how people on the island experience water can be obtained. Furthermore, the relation that people have with water can very well be expressed in the interviews. A guide for the interviews (Appendix I) was developed in order to study:

- How people on the island relate to their social and physical environment (Part I);
- How people on the Meuse-Island relate to water from an affection-, cognition and aspiration- dimension (Part II);
- How people behave regarding water related matters (Part III);
- How the shock events of 1993 and 1995 influenced the above (Optional module, only applied when applicable).

In total, a number of 16 respondents were interviewed. To give an idea on the characteristics of the respondents, 9 men and 7 women were interviewed. The average age of the interviewees is 49. Considering the greying population in the region and on the island, the ages of the people interviewed are not very different from the age composition of the people living on the Meuse-Island. Next to the age and gender, people with a variation of professional backgrounds were interviewed in order to understand how this background might relate to how individuals perceive water and how they behave regarding water related issues. An important notice is that the interview guide was used as a guide which means that the questions were not asked from start to end. As this study aims to answer how water awareness is formed, follow-up questions on relevant answers were asked and the author aimed to place the respondent at the centre stage rather than the interview guide. Due to a bunch of personalities that were put at the centre stage concise and extensive interviews took place. For practical reasons, some of the interviews took place on two occasions.

The respondents for the semi-structured interviews on the Meuse-Island were selected in two ways. First, four addresses were strategically selected in cooperation with Waterschap Roer en Overmaas and Royal HaskoningDHV. These addresses were already known by these organizations and their geographical location on a levee, or directly next to a levee was seen as an interesting starting point to study water awareness and water related behaviour. After these four household interviews, the principle of snowball selection was applied. In practice this meant that based on the interviews held so far, new interviewees were sought based on age, gender, geographical location, years of living on the Meuse-Island, occupation and role in the community. This strategy was applied as it was difficult to predict how water was experienced by people on the island beforehand. Due to the small scale of the island, a network in which new interviewees could be found was created quickly. An important note is that the total number of 16 household interviews was not set beforehand. The strategy was rather to keep planning new interviews as long as new information or insights were provided by the interviews. In total, five people who were contacted for an interview indicated that they were not willing to participate. Whereas four of them indicated that they had no time to participate, one indicated that he was not willing to participate in any kind of study as he perceived it as a waste of time.

### 3.2.2. AREA WALK AND GROUP DISCUSSION

Another method applied on the Meuse-Island is a walk through the area with three men from the volunteer fire department of Stevensweert. Due to their background, these men were able to provide some more insight in how water safety is experienced over the years. In this method, a very open approach was applied. The three men were asked to prepare a walk through the surroundings of their village whilst explaining how they experience their environment and showing which aspects of the landscape are important to them. The very open approach supported the study in answering the importance of water and the Meuse River specifically. After the walk, the interview guide which was also used for the household interviews (Appendix I) was applied to discuss the walk and to get a better understanding of how water is experienced by these three men as a combination of these data sources could provide some more in-depth insight in how water is experienced and its relation to water related behaviour.

### 3.2.3. SUBMITTED PERSPECTIVES ON LEVEE REINFORCEMENTS

Next to sources of data which were gained Meuse-Island, some submitted perspectives on levee reinforcements by inhabitants were used to get a better understanding on behaviour of people regarding water related issues. In the different submitted perspectives which were available, the attitude of people regarding water safety and water safety projects was analysed.

### 3.2.4. HISTORICAL DATA

Another important source is the historical data on the history of the Meuse-Island of which the bulk was made available by the local museum (*Streekmuseum Eiland in de Maas*). Historical sources allowed the study to get a deep understanding on the centuries of living with water and fighting against water on the Meuse-Island. This textual and visual data supported this study in providing a background for water awareness and related behaviour on the Meuse-Island. As the island is enclosed by the water for centuries, it is very probable that the presence of water have had a major influence on what the island looks like from a physical-, economic-, cultural-, and a social perspective. Furthermore the temporal dimension allows us to better understand present behaviour and predicting future behaviour.

### 3.2.5. EXPERTS AND WATER SAFETY OFFICIALS

In order to enhance the external validity of the case study, a number of 10 open interviews were held with people from regional authorities and experts on the field of water management. The names, organizations and the professional job titles of these interviewees can be found in Appendix II. Next to a better understanding of the geo-political landscape of water management in Limburg, these interviews were useful in understanding singularities and similarities regarding water safety in Limburg compared to the Netherlands, but also compared to the Meuse-Island case. The variety of professional backgrounds and organizations allows this study to provide an integral view on what the geo-political landscape in Limburg looks like. For all of these interviews, questions regarding the respondent's field of expertise and water awareness in the region were prepared. Moreover an open approach in the interviews with the water safety officials and experts was applied. This open approach allowed the respondents to share their knowledge and expertise whilst the questions did not steer their answers. Voice recordings were made of eight interviews out of the ten interviews in total. Whereas the recorded interviews were transcribed, an interview report was made of the non-recorded interviews.

For the selection of interviewees with experts and water safety officials (Appendix II), the existing network of Waterschap Roer en Overmaas and Royal HaskoningDHV was used. As the water board is the local authority on water management in the selected region, they were able to share contacts in their network that could provide useful data for this study. Furthermore the network of Royal HaskoningDHV provided interviewees with experience in Limburg and beyond. From the suggested interviewees, 10 respondents were selected based on their organization and professional background. As one of these 10 respondents was not able to cooperate, a new respondent with a similar professional background was found.

### *3.3. ANALYSIS STRATEGY*

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Most of the interviews in this study were recorded. Only for practical reasons some interviews were not recorded. Examples of these practical reasons are the area walk and an interview while being guided through the local museum. None of the interviewees indicated that they had difficulties with the use of a voice recorder. Furthermore, all interviewees from the Meuse-Island were promised that their anonymity would be safeguarded and that their answers would not be used for other purposes than this study, the associated consultancy report and related writings.

During and after the period of fieldwork, mostly transcripts and a few interview reports were made. In the first phase, the principle of sensitizing concepts and open coding was used. This principle is defined by Verschuren and Doorewaard (2007, pp. 196-197) as: 'the researcher uses multiple kinds of sources and techniques and is interested in everything that could provide him or her with information on the research matter'. This principle was applied by openly coding all textual data produced and historical data provided without using the concepts of the theoretical framework in the first place. For this process, the qualitative data software of Atlas.ti was used. As a result of the open coding applied, more and more information on the appearances and characteristics of water was found. After the process of open coding, the step towards axial coding was made. By grouping the codes of the foregoing process and linking the codes to theoretical concepts, more information on the conditions, the context and strategies applied regarding water awareness, water related behaviour and its relation with the geo-political background was found.

#### *3.3.1. REFLECTION ON FIELDWORK*

During the period of fieldwork, difficulties with finding interviewees were hardly experienced. As argued in this chapter, people were very cooperative and only a few people indicated that they were not able or willing to cooperate. Furthermore, no signals of suspicion regarding the research topic were observed. Most people were very open on how their behaviour and experiences with water. Even though it was promised that the anonymity of the respondents would be safeguarded, many interviewees indicated that they this was not a requisite for them to participate.

#### *FURTHER READING*

Following the description of the research strategy, the sources of data and the strategy for analysis in this chapter, the following chapters will present and analyse the data described in this chapter. Chapter 4 will analyse water related behaviour and the Limburgian landscape of water safety. Thereafter Chapter 5 will analyse how water safety is experienced on the Meuse-Island. By doing so, a link between the behaviour, the landscape of water safety and water awareness can be provided in Chapter 6. Last, the subsequent conclusions and recommendations for policies and further studies will be provided in Chapter 7 and 8.







## 4 BEHAVIOUR AND THE GEO-POLITICAL-, SOCIAL- AND PHYSICAL- LANDSCAPE

*It is not a secret that the best predictor of future behaviour is past behaviour. (Lee Johnson)*

As the quote above reveals, knowledge on past behaviour can be used as a predictor for future behaviour. In the research questions, the relation between the awareness of individuals with their environment and behaviour is one of the topics of study. As this chapter will argue, the experiences with floods and water are important to understand people's behaviour. This will be done in the first section of this chapter. The same events that influence people's water awareness and behaviour are also important in understanding the geo-political background which will be described and analysed in the second section of this chapter (4.2). In Figure 10, the topics of interest in this chapter are emphasized by their red borders. Following the lessons from this chapter on how people behave regarding water and how this is related to the geo-political, social and physical landscape, the next chapter (5) will look for a better understanding of the role of water awareness.

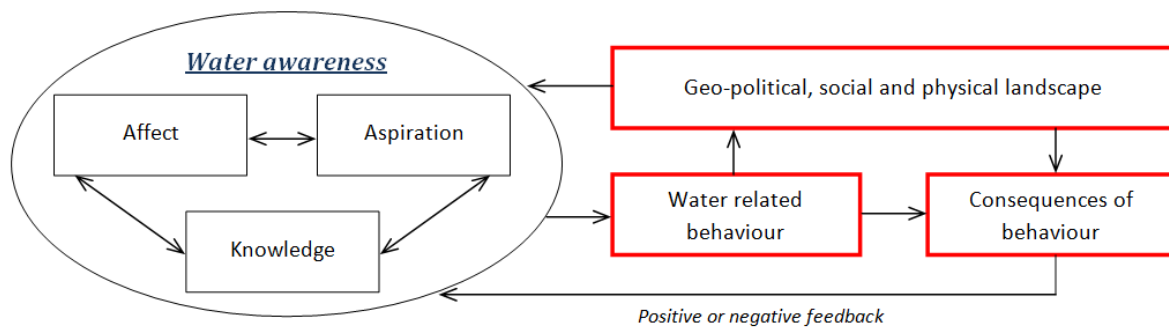


Figure 10: Conceptual model with chapter topics in red

### 4.1. WATER RELATED BEHAVIOUR: PAST, PRESENT AND FUTURE

In this section, the water related behaviour of people on the Meuse-Island will be described. To do so, a temporal dimension will be used which enables us to analyse water related behaviour over time. In order to get a better grip on this matter, behaviour of people during the floods of 1993 and 1995 will be analysed first. Thereafter measures and habitual behaviour of people from the Meuse-Island will be described and analysed. Following this description, the ignorance and indifference of people regarding water safety will be touched upon. As this subsection will argue, some people are not willing to take responsibility and some people did not even consider a flood risk at the place they live. Finally, some insights in the development of water related behaviour which is based on the findings in the previous subsections will be provided.

#### 4.1.1. BEHAVIOUR IN 1993 AND 1995

An interesting source of information in order to better understand how people behave regarding water safety is studying how people responded to critical situations in the past. The most recent critical situations regarding water safety for most of the people from the Meuse-Island occurred in 1993 and 1995. As some of the actions performed by people from Stevol will also be described in the next chapter, this chapter will touch upon the most important behaviours. Even though people from Stevol are used to live with water for centuries, the shock events of 1993 and 1995 had a magnitude that was not experienced by many people from the Meuse-Island before. Only a few people who

experienced the flood of 1926 have had a similar experience. Due to this long time without floods, most of the behaviour during the shock event of 1993 can be described as reactive. As the people living on the island did not expect and experience a flood of this magnitude before, most of the people were not very well prepared for a flood (Rutten, personal communication, March 6, 2015). The disregard of a potential flood in that time is also reflected in the stories of some of the people who experienced the floods of 1993 and 1995. These stories mostly concern damage that was suffered as a result of no or very little preparation measures in 1993. An example of damage suffered is provided by a senior man from Stevensweert.

*During the flood of 1993 we were having 30 centimetres of water in our house. I never had water in my house before. Even though we were warned to move our assets from the ground floor, I didn't do this directly. When the water was flowing into my house, I realized how serious the situation was. I managed to save most of the furniture, but the wooden floor and kitchen were completely ruined by the water. The smell of the water that was infiltrated in the floor was absolutely awful.*

Next to reactive actions to reduce the personal damage, the extent to which people were working as a collective to stop the water was exceptional according most of the people who experienced the floods. All materials and human resources available were used to prevent themselves from a levee breach. Even though the situation was critical, the community managed to prevent major breaches. Next to the feeling of success that is cherished by several people, the collective actions are remembered by many people from Stevol as very unifying and people mostly have positive memories to the shock events of 1993 and 1995. Yet, the fact that this study is conducted 20 years after the last flood seems to be very important in understanding the feelings of people from the Meuse-Island. Similar questions might have been answered very differently when they were asked 20 years ago.

The second flood of 1995 was less unexpected. As a result of the floods in 1993 both, individuals and public parties, were better prepared for a new flood. Early warning systems, evacuation procedures and adaptation strategies on the household level contributed to a more flood prepared Meuse-Island. An example is the same man whose kitchen, wooden floor and some other assets were ruined during the floods of 1993. In order to prevent future damage, this man used the compensation for the suffered damage for constructing a tile floor and a waterproof kitchen. Furthermore, he took the warnings to move his assets from the ground floor much more serious as he knew the levels that the water could reach. Due to this adaptation measures, this man was able to recover from the flood of 1995 quickly.

*It took me only one hour to clean my house after the flood of 1995. After bringing back the furniture is just continued with my daily activities. Due to the tile floor and the waterproof kitchen, I did not have any damage in 1995.*

The positive experience with the flood in 1993 seems to be one of the explanations for the fact that a significant number of people from Stevol choose not to participate in the evacuations of 1995. A frequently used reasoning for not participating in the evacuations was the fact that many people observed that the water levels were not higher than the levels of 1993. Following this observation, the interviewees who stayed in Stevol argued that this familiar water level was seen as a reason for not participating in the evacuations. Even though this seems to be a valid argument, also a rather strong sense of controllability and trust in the flood defences can be observed in this reasoning. As the people from Stevol were able to stop the water in 1993, they believed they were able to do so again by 1995. The fact that the damage of the flood of 1995 was limited in contrast to the flood of

1993 might have contributed to an even higher belief in controllability of extreme events. Furthermore the years of living with water in the form of seepage water on the island, made that the flood is not seen as very spectacular by many people from the island.

#### 4.1.2. CONSCIOUS MEASURES AND HABITUAL BEHAVIOUR

Next to behaviour during the shock events of 1993 and 1995, conscious measures and habitual behaviour as a result of the events of 1993 and 1995 or resulting from other experiences and lessons can be observed. Whereas some measures or behaviour are performed very consciously, other behaviour has become a part of the daily lives of people from the Meuse-Island. As this kind of behaviour is very usual for them, they tended to forget to tell about these kinds of behaviour during the interviews. An interesting comparison on the role of water safety in daily life was made by Inckel (personal communication, February 12, 2015).

*People are not daily occupied with the awareness that a flood might happen. It is similar to awareness of fire risks. Nobody continuously fears a fire. Yet, you can consciously prepare by buying a fire blanket and an extinguisher. Afterwards, one just continues his or hers daily life.*

~~~~~

As already appointed in the previous subsection, some people took measures in order to be better able to avoid harm. The most classic example is the construction of a tile floor. Interestingly only some older respondents who experienced the floods of 1993 and 1995 indicate that the choice for this type of floor is related to the risk of a potential flood. Even though a tile floor was observed in all houses, the people who never experienced a flood came up with other reasons for a tile floor. Examples vary from 'it is practical to have a tile floor with children' to 'I never took the time to remove these ugly tiles'. It is likely that at least some of the floors were constructed by previous owners for reasons regarding flood probability. As some people do not seem to consider this risk, some of the adaptive measures are most likely to be removed in the future. Next to the legacy of the tile floors, some other structural measures applied can be found on the island. As described in the previous chapter, the settlement pattern on the island is largely due to the altitudes on the island. After 1993, a new realization can of flood risks can be seen in the constructions. Houses and other constructions are built a bit higher. An example is given by a farmer from the island.

*I expended my business twice. The first time in 1987 I was obliged by the municipality to build the barn not too high as it would influence the scenery negatively. When I wanted to build a new barn again by 1996, I was allowed by the municipality to build the barn a meter higher. I perceived this as an opportunity to reduce future damage.*

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A remarkable form of habitual behaviour is the notion that many people from the Meuse-Island keep an eye on the water levels of the Meuse River. Most of the interviewees who show this kind of behaviour admitted that it is pleasant for them to check the water levels. The reason for most of the people seems to be emotional rather than cognitive. As one of the interviewees indicates: 'I am just interested in seeing how the water levels change. It does not necessarily make me scared.' The tracking of the water levels happens in two different ways. Some of the respondents indicate that they regularly check the water levels at Borgharen on the internet. Others prefer to drive, to walk or to cycle regularly over the levees in order to check the water levels. Besides this interest, some of the people also indicate that they do this as they just enjoy watching the water. Next to these observations, some people have to keep an eye on the water levels as their professional occupation obliges them to do so. An example is the administrator of the marina in Stevensweert. In order to

prepare on time for higher water levels, the administrator has to check the water levels on a daily base. Especially during wintertime, the water levels are observed carefully by the administrator. Similar examples were given by other people with activities in the outer levee areas. Yet, the difference with the people who are just interested in the water levels is a clear action perspective that can be observed amongst the people with activities in the outer levee area. When certain water levels are observed, these people were taught that they should take measures. Whereas the marina-administrator has to warn the boat owners and empty the marina, the farmer has to move his livestock to the inner levee area.

#### 4.1.3. IGNORANCE AND INDIFFERENCE

Next to consciously taken measures and habitual water related behaviour, some people seem to be ignorant or indifferent regarding water safety matters. According to some of the expert interviewees, the ignorance in Limburg seems to be larger than in other Dutch regions (Inckel, personal communication, February 12, 2015; Sanders, personal communication, February 20, 2015; Tonneijck, personal communication, January 19, 2015). An example of an experience in Limburg which was experienced as aberrant by a water manager comes from Sanders (personal communication, February 20, 2015).

*In Maastricht, the people did not have any notion of the consequences of their behaviour. The grass cover on the levee was fully removed, as they thought it would be a nice spot for the cultivation of plants and flowers. When the water levels are rising, the whole levee will be flushed away in a moment.*

~~~~~

Even though the appointed experts do not know exactly why the ignorance seems to be larger in Limburg, they all indicated an apparent relation with the characteristics of the Meuse, the levees and the landscape. One of these explanations is that flood defences are harder to recognize in Limburg due to their smaller sizes at many places in relation to flood defences in other places. 'Many people in Limburg do not recognize the small hills as flood defences' (Inckel, personal communication, February 12, 2015). Another reason put forward by Sanders (personal communication, February 20, 2015) is the notion that the water is mostly not touching the levees which means that they are not continuously 'in use'. Furthermore, a large proportion of Limburg cannot be reached by the Meuse. Only a relatively small area is part of the Meuse-Valley and can be affected by floods.

Next to the regional characteristics influencing the ignorance and indifference of people in South- and Central- Limburg, a probably even more important factor which is observed in the case study and appointed by some of the experts is the experience with the threats of the Meuse River. As Sanders (personal communication, February 20, 2015) puts it: 'the young generation is not aware of the risks of water'. Even though the claim of Sanders seems to be plausible, it can be made sharper. As the ignorance seems to be a result of a lack of experience with threatening characteristics of water, the ignorance should rather be described as a function of experience. Older people who moved to the Meuse-Island for example might be ignorant too as a result of no or little experience with water related threats. An example is an ignorant and somehow indifferent woman from Ohé en Laak living on a levee. In the interview it became clear that the attractive environment was the main reason for her to move to this place. Furthermore this quote strikingly shows the absence of a sense of responsibility.

*Listen, I obviously don't know very much on expectations of climate change and things like that. Probably the Meuse will overflow once at this point, I don't know. I neither know how they will improve the water safety at this place with the marinas and leisure. Yet I cannot imagine that the levee is heightened one meter just in front of me. Then I live at the foot of a levee instead of on a levee. Moreover, the insurance system in the Netherlands is working well. They will definitely compensate the damage of a flood.*

~~~~~

As this quote and other interviews indicated, some people do not take into account a flood risk at all. Furthermore they seem to play down the effects of a flood and their own responsibility to prevent harm. Even though these people fully assign the responsibility to the water authorities, they do not seem to be aware of what is needed in order to prevent the Meuse-Island from floods. In this quote, this is also touched upon as the senior woman cannot imagine that her view will be sacrificed for the sake of water safety.

#### 4.1.4. FUTURE BEHAVIOUR

As indicated in the previous subsection, people with little or no experience with water related threats are often not aware of what is needed in order to prevent them from floods. According to Duisings (personal communication, February 12, 2015), communications consultant at the regional water board, the societal acceptance of a flood is declining. 'People increasingly expect that the water board will preclude floods without necessarily accepting the consequences.' As the memories of the floods of 1993 and 1995 are getting further and further away, the group of people who experienced a flood is getting smaller. As this experience proved to be one of the most important factors in ones related behaviour, it seems willingness to fight that risk is getting smaller over the years.

It seems that the increased safety from raising the dikes on the Meuse-Island contributes to a declining willingness of people to take their own responsibility. After the floods of 1993 and 1995, new levees were constructed and some levees on the island were reinforced. Due to the decreasing awareness of the flood risks, people seem to be less inclined to adopt measures to decrease the effects of a flood. Following this line of argumentation, it is not likely that people will take more responsibility in reducing the effects of a flood. The path-dependency that the Dutch water management is caught in also seems to apply on the Meuse-Island case: 'As the Dutch have invested mainly in reducing the probability of flooding, the consequence of this is a lack of flood awareness amongst the Dutch population (Meijerink & Dicke, 2008)'.

As the awareness of the risks is getting smaller, it gets more difficult for people to deal with regulations made in order to maintain an open area in which the river can flow. This was also observed on the Meuse-Island. Especially the interviewed entrepreneurs were seeing opportunities to grow their businesses or to improve the attractiveness of the Meuse-Island as a place for leisure and tourism. As some of them indicate, they feel that little space is given to them by the authorities. As most of these entrepreneurs experienced the floods of 1993 and 1995, they know what these regulations are meant for. Assuming that this understanding will continue to decrease, increasing tensions between the local entrepreneurs and the water authorities can be expected. The view of one of the entrepreneurs is shown in the following quote.

*In my opinion it is very important that the water board and other authorities make sure that they do not proceed too unilateral. Instead, they should aim to facilitate citizens and entrepreneurs. If you reject all kinds of requests, entrepreneurs and citizens are no longer willing to cooperate. The regulatory burden is too great! From an economical point of view many opportunities are missed. The authorities should stop*



*with simply saying 'no'. They'd rather participate in looking for possibilities instead of focusing on impossibilities.*

.....

Following the argumentation of this entrepreneur, which also represents the opinion of a few others, it is getting increasingly difficult for water authorities to explain and perform their policies. As some people have the feeling that the policies do not serve other purposes than water safety, which is not seen as a priority by them, the trust in the water authorities decreases. As Inckel (personal communication, February 12, 2015) strikingly puts it: 'water safety measures are seen as a burden for the vast majority of the time, whilst they are being cherished rarely'. The lower the perception of the flood probability, the more water measures are seen as a burden, rather than as a blessing.

## 4.2. *GEO-POLITICAL, SOCIAL AND PHYSICAL LANDSCAPE: REGIONAL AND NATIONAL TRENDS*

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Over the past decades the Limburgian landscape has changed in multiple ways. Most eye-catching are the projects of Sand-Meuse (*Zandmaas*) and Border-Meuse (*Grensmaas*). These projects in which enhancing water safety and spatial development are the primary objectives have been going on for years and are nearing completion in the coming years. Inevitably these projects have changed the Limburgian water landscape in different ways. As a result of these changes, the Limburgian relation with water awareness and behaviour of people might have changed too. In this section some of the trends of working in the Limburgian water landscape will be described and analysed. Furthermore some specific regional challenges will be discussed in the first subsection. The second subsection will describe and analyse the interaction between different parties in the Limburgian water landscape. As it will discuss, the policies described in the first subsection seem to be a bit contradictory. For people in South- and Central- Limburg it is sometimes difficult to understand the action perspective of risk communication. Furthermore processes of spatial development are often seen as rather sealed for civilians. From the different lessons, the need for integrated approaches will be described in the last subsection. This might be the strategy to proceed in future water policies.

### 4.2.1. *WORKING IN THE LIMBURGIAN LANDSCAPE*

As two generations grew up without being aware of the risks that were involved in living along the Meuse River (Tonneijck, personal communication, January 19, 2015), more and more was built in the floodplains of the river up to the floods in the 1990s. After the floods of 1993 and 1995, the policies regarding building in the floodplain of the Meuse changed radically. Very few activities were allowed after these shock events. Furthermore the physical landscape of Limburg changed significantly as a result of the different water safety projects in the province. Yet, working in the Limburgian landscape is involved with some remarkable differences from working on water safety in other Dutch places. The physical characteristics like the hilly landscape and the relatively small floodplain of the river are very different from the polders in the more northerly region of the country. These physical characteristics also influence the area that is potentially exposed to floods. Whereas water in a flat polder-landscape can inundate large areas, the potential inundation area in the 'bathtub' of the Meuse-Valley is significantly smaller. Next to physical differences, the feeling of being a part of a Delta is not shared by most of the people in South- and Central- Limburg. Yet, this also relates to the physical landscape as this other feeling towards water is seen as a result of the Meuse-Valley as a 'bathtub'.

The somewhat deviant situation in Limburg also challenges the water authorities to adjust their policies to the regional situation. Some policies and measures applied in other parts of the

Netherlands do not fit in the Limburgian landscape. Furthermore the tradition of constructing dikes and levees in Limburg in South- and Central Limburg is much younger than for example the Dutch river region. These specific challenges for the Limburgian water managers were particularly experienced after the floods of 1993 and 1995. As the flood defences along the Meuse River in Limburg got appointed as primary flood defences by The Hague, it was apparent that much had to be done to enhance the Limburgian water safety. The complications for the water manager are strikingly described by Tonneijck (personal communication, January 19, 2015) who has been involved in the policy development needed to enhance water safety in Limburg.

*Water safety projects in Limburg are complicated for two reasons. First, the regional water boards have a relatively short history with constructing and maintaining flood defences. Secondly, due to the existing infrastructure little room is left for suitable measures.*

~~~~~

Especially the second challenge described by Tonneijck (personal communication, January 19, 2015) is encountered often in the past decades of working on the Limburgian water safety. Since flood defences in Limburg are much younger than most of the flood defences in other places of the country. As described before, a significant part of the defences only dates from after the floods of 1993 and 1995. Partly due to the short period of time in which the emergency levees had to be constructed, the quality of the flood defences in many Limburgian places is inferior in comparison to flood defences elsewhere in the Netherlands. The drawbacks of the rapid construction of emergency levees after the floods of 1993 and 1995 are strikingly described by Inckel (personal communication, February 12, 2015).

*After the floods of 1993 and 1995 the levees were constructed very fast. It was like some clay was found and they just constructed a nice small hill. I know, I am exaggerating, but we see now that much of what was done after the floods has to be put aside in the new flood protection projects.*

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Next to the downsides of the rapid construction of levees after the shock events of 1993 and 1995, The Limburgian landscape is also a challenging factor in the construction of flood defences. Whereas many river landscapes in the Netherlands are very flat and open, the Limburgian landscape at many places can be described by its smaller scale and a higher proportion of vegetation. Following this features of the Limburgian landscape, it is argued that water safety projects in Limburg radically change the landscape. As Inckel (personal communication, February 12, 2015) puts it, 'you are quickly crafting at the landscape if you want to enhance the water safety levels here'. Inevitably, the more drastic consequences of taking water safety measures provide a challenge for the water manager. Since many people in South- and Central- Limburg feel attached to the landscape, it is a great challenge for a water manager to explain people the need for these drastic measures. From this point of view, Inckel (personal communication, February 12, 2015) argues that dikes and levees fit better in a polder-landscape where everything is grand and spacious. Another challenge for the water manager in many places of South- and Central- Limburg are the multiple functions on a small piece of land. In the case of the Meuse-Island, which is located on one of the so-called 'narrowest part of the Netherlands' many functions are combined on a small surface. The presence of a highway, a railroad, the Julianakanaal (canal), the village of Echt and the villages on the Meuse-Island result in a small space for the water managers for implementing water safety measures. Since it is undesirable to narrow the flood plain of the Meuse, houses, backyards and businesses are easily affected in water safety measures. From a theoretical perspective, individuals suffer from the group interest of water safety. As people are inclined to focus on their own interest, rather than the group interest,

resistance of people who are personally affected is experienced in previous water projects and may be expected in the future. Many examples of the so-called NIMBY-principle (Not In My BackYard) can be found in the Limburgian context. In conclusion, the multiple forms of land use, the short history with water safety projects and specific features of the Limburgian landscape provide a challenging context for the Limburgian water manager to enhance water safety levels. As Inckel (personal communication, February 12, 2015) aptly summarizes the Limburgian challenges: 'Working on water safety in South- and Central- Limburg is like pioneering on a stamp'.

Next to the challenges for working on water safety, the large flood protection projects have had major influences on the eco- and river- system in the province. 'Due to years of 'messing around', the unique ecosystem of the Meuse is somewhat disturbed'. Even though the Sand-Meuse and the Border-Meuse project pretend to work on both, water safety and natural development, Van Schijndel (personal communication, March 26, 2015) argues that water safety and economic interests seem to prevail over nature development. Even though nature is created as a result of these projects, much more would be possible when a higher priority would be ascribed to natural development. Another critique on the flood protection projects is that the Meuse is still placed in a straightjacket. Since the Border-Meuse forms the border between the Netherlands and Belgium, somewhat unnatural measures are taken to stop the Meuse from determining its own route.

#### 4.2.2. INTERACTION AND DIVISION OF RESPONSIBILITIES

As described in the theoretical framework in Chapter 2, the geo-political landscape of water management opened up over the past decades. This opening up towards new fields of expertise can also be found in the water safety projects in Limburg. As Tonneijck (personal communication, January 19, 2015) and Inckel (personal communication, February 12, 2015) argue, non-political stakeholders are increasingly involved in the Limburgian water projects. Consultations and negotiations became a default component of the environmental process. The so-called 'kitchen table talks' became conventional in the process towards new flood safety projects. Nevertheless, interaction with civilians and other non-political stakeholders seems to remain a point of discussion. A general belief that by 'keeping the process small', less obstacles will be found on the road towards new flood protection measures seem to be closely interwoven with the field of water management. Following this line of thought, it is argued by some water managers that choosing for a higher involvement of non-political stakeholders will slow down the process towards new flood protection projects. On the other hand some people in the field of water management argue that a higher degree of involvement can contribute to the early detection of resistance and enhances the legitimacy of the eventual measures as people play a role in the development of the flood measures. As Duisings (personal communication, February 12, 2015) argues, interaction with civilians can contribute to the understanding of the water authorities' value.

*In the past few years, the existence of water boards is increasingly discussed. People are asking why we need water boards. In order to demonstrate our value for society, a certain urge to show what we are able to do can be found. On the one hand the environment asks us to show ourselves, and on the other hand we gratefully use these opportunities.*

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Another trend that can be observed after the shock events of 1993 and 1995 is the growing demand for democracy. According to Duisings (personal communication, February 12, 2015), 'people are expecting to have a voice in future water projects. Especially the people who experienced a flood before have the feeling that the authorities should incorporate their opinion.' The demand for comprehensible information is growing (Duisings, personal communication, February 12, 2015). 'Only

when the urgency of water safety projects is explained well, people will understand the use and the urgency of water safety measures. Yet, we can never fully meet all interests. Therefore we have to be open about the balancing of interests. But even then some people will not be satisfied.’ Nevertheless, the position of water safety policies in relation to other interests is still far from equal. As Van den Berg (personal communication, April 3, 2015) argues, water safety is still a big stick which can be used by the water authorities. In contrast to for example the local municipality, the need for the water agencies to involve other parties is much smaller as their judicial position is very strong. This relationship between various interests and water safety can also be found in a quote of Timmers (personal communication, February 24, 2015), a legal consultant at the water board Roer en Overmaas:

*There are opportunities for civilians and entrepreneurs to exert their influence, but obviously safety is the first priority and prevails over a good view and other personal interests. When the project design is well substantiated, they will be the ones who lose out. When studies have not been performed well, there is more space for people for opposition. Therefore it is important to create support. We have to show people what the best solutions are, even though this might be unfortunate for them.*

As this quote reveals, the legal position of water safety projects is very strong. Due to this strong position, water authorities can afford to involve civilians late in the process. This was also observed in the case of the Meuse-Island. Whereas the so-called ‘kitchen table talks’ and the informational meeting were planned during the design phase of the levee reinforcement project, the public consultation round was postponed until after the completion of the designs. The reasoning of this decision was that a later consultation round would be better as the water board would be better able to communicate how the levees would be enhanced. Even though this process is not finished yet, it seems that the foregoing reasoning implies that there is limited room for people from the Meuse-Island to adjust the flood protection measures. Following this argumentation, it seems that the people of the Meuse-Island will be informed, rather than consulted. A heavily litigated and well thought design can contribute to a successful process without too much delay. This was also learnt in another Limburgian cluster which was strongly delayed as the implementation started whilst too many uncertainties were not excluded yet.

*One of the clusters has been a very bumpy ride. As the focus in this project was entirely focused on rapid progress, many problems were encountered during the implementation phase. I think we had too little knowledge on the characteristics of the project area.*

As mentioned in the theoretical framework of Chapter 2, a flood risk approach in which the authorities strongly focus on prevention might decrease the water awareness of people as they feel very well protected. In the case of the Meuse-Island, it seems that the water authorities are taking the full responsibility for flood protection. By involving people at a fairly late stage, the inhabitants of the Meuse-Island are hardly incorporated in the process of flood protection. Following this argumentation, it is not admissible that people will feel more responsibility after the implementation of the flood safety measures. Rather a decreased awareness of flood risk is plausible as people observe that the water authorities take full responsibility for their water safety.

#### 4.2.3. INTEGRATED AND SOCIETY ORIENTED APPROACHES

Even though some reasonable arguments for a high degree of closeness in water safety projects can be named, some reasonable reasons for a higher degree of openness and a more central role for

local stakeholders can be found too. The supposition of some water managers that a higher degree of involvement of private stakeholders leads to a laborious and slow process does not apply in many cases according to some of the expert respondents (Duisings, personal communication, February 12, 2015; Timmers, personal communication, February 24, 2015; Tonneijck, personal communication, January 19, 2015; Van Schijndel, personal communication, March 26, 2015). An integral approach can contribute to the speed of the process instead. Following a number of examples in which local inhabitants and entrepreneurs were informed late in the process, a relation between the degree of openness towards local actors and the delay of water safety projects can be found (source). Moreover, involving private actors can contribute to the public support. Especially in terms of enhancing the legitimacy of the water boards, a more integrated approach might enhance involvement of people on water safety matters. Furthermore the risk awareness of people concerning water safety might improve as they become part of the search for solutions. The attitude of the water authorities and the use of integral approaches are strikingly described by Van den Berg (personal communication, April 3, 2015). As he aptly puts it, a more open and integrated approach is needed in order to enhance the public support for water authorities.

*If the water authorities don't mind to be on an island, it is no use for them to adopt a more integrated approach. If they are willing to create more societal support, they have to become more open to cooperate with other parties. But don't forget that they were even more closed before.*

Next to enhancing the legitimacy and societal support, integrated approaches can contribute to a win-win situation in which both, the interests of the water authorities and the interests of local stakeholders, are served. By offering opportunities for local entrepreneurs to grow their businesses whilst water safety levels are enhanced, a higher degree of acceptance for water safety measures can be expected. Furthermore combining water safety with for example natural or cultural development strengthens the feeling of urgency for people living in flood prone areas.

*The water authorities have a very good reason to enhance the water safety in the region. We understand their argumentation and therefore do not discuss their intentions. Yet, opportunities are often missed to serve multiple purposes at once.*

As Van Schijndel (personal communication, March 26, 2015) indicates, chances to cooperate with other authorities or public stakeholders are often missed by water authorities in the Limburgian landscape of water management. Even though Van Schijndel indicates that the reasons of the water authorities for working on water safety are very clear, he argues that the technical approach of the water authorities is sometimes a bit exaggerated: 'The technicians who are immersed in the models dominate the field of water management. Sometimes I sometimes wish that the common sense is used a bit more. Do we really need to proceed like this?' As the next Chapter (5) will discuss, a number of people from the Meuse-Island also have the feeling that water safety matters are often approached in a very unilateral way. A deeper understanding in where this feeling is coming from and how people on the Meuse-Island relate to water safety matters will be provided in the next Chapter (5).

#### 4.3. CONCLUSIONS

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Since the threat of a flood on the Meuse-Island is limited, a few types of behaviours regarding water safety were found on the Meuse-Island. As people on the Meuse-Island were surprised by the high water levels in 1993, hardly any preventive measures were taken by people in order to prevent



themselves from a flood. Therefore, behaviour during the shock event of 1993 can mostly be typified as reactive. Instantly, all materials and human resources available were used by people from Stevol in 1993 to prevent themselves from a levee breach. Even though the situation was critical, the community managed to prevent themselves from major breaches. The second flood of 1995 was less unexpected. As a result of the floods in 1993 both, individuals and public parties, were better prepared for a new flood. As a result of the experiences of 1993 and 1995, many people from the Meuse-Island adopted measures in order to be better able to respond to a new flood. Roughly two types of behaviour can be seen as a response to the shock events. First, some people adopted incidental measures like the construction of tile flooring and elevated constructions. Secondly, more structural behaviour was observed in the data. As some of the respondents indicated, they are keeping track of the water levels after the shock events of 1993 and 1995. It seems that aspiration for preventive measures and the actual behaviour to perform these measures is decreasing over the years. Nevertheless, some people with activities in the outer-levee-areas of the island are still performing preventive measures. As the floodplains of the Meuse are inundated more often, preventive actions have a higher priority for these people.

Whereas the support in Limburg for working on water safety was very high after the floods of 1993 and 1995 was very high, the societal demand for enhancing water safety in Limburg decreased over the past years. After the floods of 1993 and 1995, the policies regarding building in the floodplain of the Meuse changed radically. Very few activities were allowed after these shock events. Furthermore, policies regarding water safety in Limburg increasingly focused on the prevention of floods. As the flood defences along the Meuse River in Limburg got appointed as primary flood defences by The Hague, it was apparent that much had to be done in order to enhance the Limburgian water safety. As a result of appointing the flood defences in Limburg as primary defences, the focus in water safety shifted towards the prevention of floods. Whereas the Meuse-Valley was having a flood protection level of 1/50, flood defences in the Meuse-Valley now are constructed with a protection level of 1/250.

As argued in this chapter, the demand for integrated and society oriented approaches regarding water safety is growing. The supposition of some water managers that a higher degree of involvement of private stakeholders leads to a laborious and slow process does not apply in many cases according to some of the expert respondents. An integral approach can contribute to the speed of the process instead. Moreover, involving private actors can contribute to the public support. Especially in terms of enhancing the legitimacy of the water boards, a more integrated approach might enhance involvement of people on water safety matters. Furthermore the risk awareness of people concerning water safety might improve as they become part of the search for solutions.

#### *FURTHER READING*

Following the behaviour and the landscape of the Limburgian water safety described in this chapter, the following chapter will analyse how water safety is experienced on the Meuse-Island. By doing so, a link between the behaviour, the landscape of water safety and water awareness can be provided in Chapter 6. Thereafter the subsequent conclusions and recommendations will be provided in Chapter 7 and 8.



## 5 WATER AWARENESS ON THE MEUSE-ISLAND

*‘Water is both, our friend and our enemy. The Dutch prosperity is largely due to its location in a delta and the presence of its rivers. Yet, the presence of water makes us vulnerable too. Climate change and rising sea levels oblige us to keep working on water safety levels. In the Netherlands we will never be done with working on our water.’ (Onswater)*

As argued in the quote above, water has been very important in the development of the Dutch landscape and culture. Even though many inhabitants of Limburg do not perceive their province as a part of the delta (Duisings, personal communication, February 12, 2015), water is and has been an essential part in the everyday life of people living along the river Meuse. In this chapter the role of the river for people on the Meuse-Island will be discussed. Describing the role of the river allows us to analyse the water awareness on the island. As mentioned before, water awareness is concerned with both: the awareness of water-related opportunities, and the awareness of water-related threats. In the first section a historical perspective on water awareness on the Meuse-Island will be provided. The history of the island may be an important factor in the present-day awareness and water-related behaviour. After giving the historical perspective, the second, third and fourth section will describe and analyse the three dimensions of water awareness: affect, cognition and aspiration. Ultimately the fifth section will link the three dimensions of water awareness and will provide an overview of different kinds of water awareness on the Meuse-Island. This analysis will be used in the next chapter which aims to find links between water awareness and water-aware behaviour. In the figure below (Figure 11), the subject areas of interest in this chapter are indicated by the red oval. Whereas Chapter 4 touched upon the water related behaviour and the geo-political landscape, this chapter aims to enhance the understanding on the underlying water awareness. The subsequent relations between the different water awareness, water related behaviour and the geo-political landscape will be touched upon in Chapter 6.

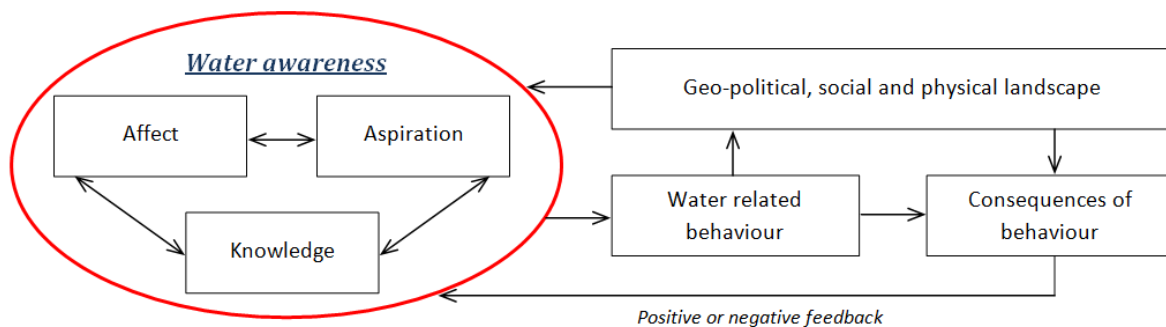


Figure 11: Conceptual model with chapter topics in red

### 5.1. A HISTORICAL PERSPECTIVE: PROSPERITY AND ADVERSITY

*‘One should be acquainted with the past in order to understand the present.’* This well-known Dutch proverb is very meaningful when describing water awareness on the Meuse-Island. Throughout the past centuries, the Meuse River has played a key role in the life of people on the island. Over the centuries the river is perceived as both, a threat and a blessing (Rutten, personal communication, March 6, 2015). A historical perspective on the mutual relationship between the Meuse and the

inhabitants of the island is elaborated in this section. The aim of this section is not so much to give a detailed overview of all major events related to interactions between the Meuse and people on the island. This section rather aims to delineate how threats and blessings influence the relation between people and the Meuse River. As this section will argue, the location in relation to the Meuse has had a major economic and cultural influence on the communities living on the Meuse-Island.

#### 5.1.1. FERTILE CLAY SOILS AND ECONOMIC OPPORTUNITIES

As argued before, the Dutch rivers entailed welfare to the communities living along the river. In the Meuse Valley traces of Meuse-related prosperity can be found too. Besides the strategic location on a trade route, the clay deposited by the Meuse provided fertile arable land. Before the existence of fertilizers, arable farmers on clay soils had much advantage over arable farmers on sandy soils. The prosperity resulting from the fertile soil can still be found in the Meuse Valley (Van Schijndel, personal communication, March 26, 2015). From a physical point of view the farms in the Meuse Valley are mostly bigger, neater and more embellished. A cultural example can be found in the manner in which carnival is celebrated. Whereas carnival on the sandy soils is often typified as 'modest' or 'subdued', carnival on the fertile clay soils is celebrated in a more exuberant way. 'People in the valley like to show their wealth while people on the sandy soils already had enough mouths to feed' (Van Schijndel, personal communication, March 26, 2015).

#### 5.1.2. DISCOMFORTS AND ADAPTATION STRATEGIES

As argued by Rutten (Rutten, personal communication, March 6, 2015), water has been a blessing and a curse throughout the history of the Meuse-Island. Farmers on the island were frequently confronted with nuisances caused by high water levels in the Meuse River. As the island clearly was a peasant community up to the early 20<sup>th</sup> century, floods were a serious threat for most of the people living on the island. Strong water currents led to great harm as fertile clay soils were regularly flushed away by the power of the river. Consequently, infertile gravel soils remained after the water levels dropped. Next to the loss of fertile grounds, floods during the season also destroyed significant amounts of crops. The threat posed by the Meuse can be retrieved from several historical documents. An example in which this threat is articulated comes from a farmer and dates back to a flood that occurred in 1880. According to Rutten (Rutten, personal communication, March 6, 2015), a personal letter like this demonstrates the impact of natural disasters for people on the island.

*The water level out here was almost a foot higher than the water level of 1850. Therefore the water ran over the dike which made our Meuse-Island look like a large sea. Many people from the hamlet 'Eiland' were forced to flee their homes with their livestock. We gave shelter to the Janssen family who stayed at our farm with all their family members. Anyone with family in distress had to do the same.*  
(J.W. Indemans, January 1<sup>st</sup>, 1881)

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As this first quote from the letter reveals, Mr Indemans clearly experienced the flood as a threat. The author compares the flood of 1880 with an earlier flood of 1850. According to his observations, the water in 1880 was almost a foot higher than the known flood of 1850. Regardless the correctness of his observations, the comparison with the flood of 1850 indicates that the threat of the flood was taken very seriously by Mr Indemans. Describing the Meuse-land as 'a large sea' also underlines the perceived earnestness of the situation. Next to the serious perception of the flood of 1880 by Mr Indemans, the sense of community can be found in the last two sentences. This supportive attitude in times of floods can be found in more historical sources and stories told by the respondents which



will be elaborated on in the fourth sub-section (5.1.4). The personal harm of the flood for Mr Indemans can be found in the next quote which comes from the same letter.

*'The field is almost fully submerged at the moment. It is feared with reason that the underlying soil and the winter cereals have been flushed away. Inhabitants of your municipality are fortunate as they do not have to fear the Element. We, the people from Stevensweert, are fearful that we ever have to leave the Meuse-Island due to the low altitude of our farmlands and dwellings.'* (J.W. Indemans, January 1<sup>st</sup>, 1881)

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From the foregoing quote, it can be concluded that the author fears for his assets. Mr Indemans takes some major economic losses into account as he fears that the soil and his winter cereals have been flushed away. His respect for the impact a flood may have is considerable. Stressing the fortunate position of his family members who do not have to fear for floods denotes the seriousness of perceived threat by Mr Indemans. This is also indicated by the capital 'E' in Element, which he uses to describe water. By calling describing floods as a result of the 'Element', the author indicates a certain degree of unmanageability. The 'Element' determines whether or not a good yield will be achieved. A fear of ever having to leave the Meuse-Island indicates that the (perceived) threat might disable the author to adapt to the living conditions on the island.

Even though floods regularly brought significant losses for the farming community, historical data sources do not only stress the negative aspects of floods. Even in winters without flooding, seepage water flowed through and over the levees each winter. Water in the basements of houses was not very exceptional for many inhabitants of the Meuse-Island. Due to regular experiences with water, the Islanders learned to live with the water (Rutten, personal communication, March 6, 2015).



Figure 12: Town square Stevensweert, 1850



Figure 13: Stevensweert, 1926

The images in Figure 12 and 13 give an interesting glimpse on how floods also were perceived by the people living on the Meuse-Island. Larger versions of these images can be found at the title pages of Chapter 2 and 4. Figure 12 on the left is a painting of the town square of Stevensweert. Even though the square is one of the higher places in town, the square is fully flooded on this painting. Yet, this painting is very interesting when it is compared with other paintings from the 19<sup>th</sup> century. Whereas other images of floods usually present a highly menacing image, the painting of the town square can



be typified as harmonious (Rutten, personal communication, March 6, 2015). A threatening stormy portrayal was more common when a flood was painted. The man with the horse and carriage on the right of the painting seems to be doing daily businesses, while two men on the rowing boat smoke a pipe while paddling. Apparently, people on the Meuse-Island found ways of dealing with the discomforts of the floods that were involved with living on the island. Water on the streets was like a part of the village calendar and people were not worried about some water in the streets and in their basements. This 'down to earth attitude' as some of the respondents call it is also shown in Figure 13. The flood of 1926 offered the opportunity for children to play in and with the water on the streets. A respondent who has been living on the island his entire life stresses this positive experience with flooding too.

*I recall very well that we always went outside to play when the streets were flooded. While some people were mopping their basements, we had lots of fun! For us it was perfectly normal that the streets were flooded regularly.*

~~~~~

Next to the 'down to earth attitude' of the inhabitants towards flooding, the islanders learned to apply adaptation strategies throughout the years. An example is the original contiguous settlement of Ohé en Laak. Places of settlement are slightly higher than the rest of the island. This pattern which originates from the early 19<sup>th</sup> century indicates that inhabitants of Ohé en Laak are accustomed to adapt to high water levels for a long time (Van Lankveld, personal communication, March 20, 2015). Next to the settlement patterns, individual adaptation strategies are applied on the Meuse-Island too. Some individuals constructed small mounds to prevent their houses from flooding. Another frequently used strategy is the use of tile flooring on the ground floor. The advantage of tile flooring is that people can easily clean their houses after a flood (Satijn, personal communication, March 6, 2015). In Chapter 4 more insight in adaptation strategies was provided.

### 5.1.3. THE SHOCKING EVENTS OF 1993 AND 1995

As the water levels rose to critical levels again by January 1995, the authorities were much better prepared for a flood. Since Ohé en Laak and Stevensweert are located on an island, the authorities did not want to take big risks again. If the water levels would continue to rise, inhabitants could be getting trapped on the island as access roads would become impassable. In order to prevent the inhabitants of the Meuse-Island from this scenario, the island had to be evacuated on time. On the 26<sup>th</sup> of January 1995 the mayor of the municipality of Maasbracht started sending informational letters to the inhabitants of the Meuse-Island. The earnestness of the first letter is somewhat subdued. People are advised to move their assets to the first floor in order to avoid needless harm. The second letter of the 27<sup>th</sup> of January 1995 is already a bit more intense. The mayor uses more severe words and he appoints for the first time that certain levees might not be able to prevent the inhabitants of the Meuse-Island from flooding. In this letter, the mayor also indicates that an evacuation may be needed soon. People on the island should be prepared to leave their homes.

*I consider it necessary to advise you to prepare for a potential evacuation. I urge you to move your properties away from your basement and ground floor so that you will be able to evacuate quickly. If you do not follow this advice, I cannot guarantee that necessary aid can be provided in time. Utilities may stop and supply of food and other basic needs is no longer guaranteed. (January 27<sup>th</sup>, 1995)*

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After the letter by the mayor, the situation remains stable for a couple of days. On the 30<sup>th</sup> of January the water reaches critical levels which compel the authorities to start evacuating the Meuse-Island. It

can no longer be guaranteed that the access roads to Maasbracht will remain passable. The sharply increased seriousness of the advice by the mayor is also indicated by the head of the letter which says: 'URGENT URGENT URGENT URGENT'. Even though evacuation is not obliged, the mayor tries to appeal on the citizens' sense of responsibility.

*The mayor asks you urgently to leave your house before 6 pm. Do not jeopardize your personal safety and the safety of aid workers. At his moment unobstructed evacuation is still possible. Soon this will no longer be possible. We also urge you to evacuate your livestock as soon as possible. Please help each other and do not forget to pay attention to the elderly and disabled. (January 30<sup>th</sup>, 1995)*

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Although the letters by the major indicate a very serious situation, many inhabitants of the Meuse-Island decided not to participate in the evacuations. Many inhabitants felt that the authorities acted too panicky (Rutten, personal communication, March 6, 2015). Most of the respondents who lived on the island during the shocking events indicated that they did not participate in the evacuations. One of the respondents soberly remarks that she did not see a reason for evacuation as her house is located high enough. 'The water will not flow into my house.' Other respondents came up with similar reasons for not participating in the evacuation. It is remarkable that the advice is interpreted very differently by the respondents. Whereas most of the respondents did not follow the mayors' advice, two respondents indicated that it was entirely logical for them to follow the advice: 'the official of the municipality told us we had to evacuate, so we simply followed his advice.' A remarkable similarity amongst the respondents who decided to stay on the Meuse-Island is that they all make clear that the periods of high water are also perceived as unifying events. The threatening periods are also described as cosy (*gezellig*) and exciting (*het heeft wel wat*). One of the respondents describes his positive memories on the high water period of 1995 as follows.

*It truly was quite cosy! Our wives and children went to a nice holiday resort. What about the men? We have been drinking lots of beer, really! I'm sure that the café owner earned a lot of money. All women were out of town, so all men went to the pub. That brings people together, doesn't it?*

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The shock events of 1993 and 1995 demonstrate that individuals respond very different to similar situations. Whereas some people are very much focused on preventing themselves from threats, others tend to play down the risks they are exposed to. Theoretically, the preventive awareness is unevenly distributed. Same flood risks are perceived differently amongst the inhabitants of the Meuse-Island. In the next three sections some more insight in different levels of risk perceptions and water awareness will be sought. The three dimensions of water awareness (affect, cognition and aspiration) will be touched upon in the following sections. By separating the different dimensions, more insight will be provided in how water awareness amongst citizens of the Meuse-Island is constructed.

## 5.2. AFFECT

In this section the first dimension of water awareness will be described and analysed. As pointed out in Chapter 2, the affective dimension refers to the meaning someone gives to water. According to Stronk et al. (2003) the environment cannot be observed objectively. Each individual assigns a different meaning to stimuli from the environment. In this section, the meaning that people assign to the environment on the Meuse-Island will be described and analysed. This section aims to describe both: singularities and similarities in meanings ascribed to the environment by people from Stevensweert and Ohé en Laak. As argued by Duisings (personal communication, February 12, 2015)

it is important to recognize the feelings that people have. Her quote below indicates that next to the factual situation, people living amongst the Meuse can have numerous reasons to develop certain feelings regarding for example their safety.

*It is important to recognize the feelings that people have. From your office you can claim that the water system is in control. Meanwhile an inhabitant who experienced a flood before might become worried when he or she observes a lot of rainfall. Of course you can just tell them that it is all safe, but we should not deny the sentiments that make people feel worried.*

~~~~~

This section is divided into three subsections. The first section aims to describe and analyse the bond that people from Stevol (Stevensweert and Ohe en Laak) have with their villages and with the island. As this subsection will describe, this bond is very strong for people who are born on the Meuse-Island. The second subsection will explore the bond that people have with their physical environment. This section aims to discuss the importance of the Meuse River for the inhabitants of Stevol. The third subsection aims to analyse the sense of security regarding water safety. The way in which people develop their sense of security will be touched upon in this subsection.

#### 5.2.1. THE ISLAND FEELING

Even though the Meuse-Island is not an island from a factual point of view, many people from Stevensweert and Ohé en Laak call themselves 'Islanders'. In fact, the Meuse-Island only is an island when the spillway of Contelmo is opened during periods of high water levels (Van Lankveld, personal communication, March 20, 2015). Yet, the island-perception is not strange as the island is surrounded by water and the 'Julianakanaal' or the Meuse River should be crossed in order to reach the 'mainland'. As this subsection will describe, some people feel like genuine islanders whereas others do not share this 'Island feeling' at all. This subsection aims to describe the relation of the respondents with the place they live. From a theoretical point of view, a strong connection between people and their environment will influence the water awareness positively. This affective connection is also emphasized in the definition of water awareness (De Boer, Goosen, & Huitema, 2003). *'The idealized image of water awareness is that people: feel connected to their environment, know about subsequent ecological processes and components, and are inclined to handle it in a respectful way.'*

The connectedness of the people from Stevol with their environment is rather differentiated. Amongst the respondents, a remarkable division in perceptions can be found. All respondents who were born in Stevol perceive themselves as 'Islanders'. This term which seems to be a sentimental value is less evident amongst respondents who have not been born in Stevol. This less strong connection to the island does not mean that these people feel not connected to the island at all. Especially the appealing physical environment is highly appreciated by most people from this group. This relation will be touched upon in the next subsection.

In general, all respondents agree that Stevol is a rather closed community. People ascribe this closed nature to a village atmosphere, an expectant attitude, a peasant background, few changes and an active club life. According to Rutten (personal communication, March 6, 2015) the village atmosphere and the fact that most of the islanders are member of at least one of the leisure associations make that people know each other and that the community is very close. This closeness is not necessarily experienced as a disadvantage by newcomers. Yet, some of them however indicate that it is rather difficult to become a part of the community as an outsider. Participating in the local

activities and associations is the best manner to become part of the community according to some of the 'native' Islanders. An example of this advice is shown below.

*After the sister of Karla got married, she moved to Stevensweert. She asked: 'how can I become part of this community?' I advised her to become a member of the soccer club, the militia or the harmony. You should join at least one of the clubs and it also depends on your attitude. If you are a member of one of the clubs, you can be incorporated in a committee and you will get to know new people soon.*

Especially the people who have been born on the Meuse-Island feel a very strong connection to the place they live in. They are proud on the Islands' history which enhances their connection to the island. This history is also used by the Islanders to differentiate themselves from the Dutch people and other people from Limburg. An example is the so-called dark hair colour of the people from Stevensweert. As a result of the Spanish occupation, people from the Meuse-Island are different from others as Spanish blood is flowing through their veins. Whereas some of the respondents indicate that they perceive this story of a different hair colour as a nice cultural myth, others believe that these differences can really be observed. Anyhow, the connection of the people from Stevol with their place can mostly be described as very strong. All of the born Islanders indicate that they would never consider leaving the island. One of the respondents gives a strong example which proves the strong bond with his village. Even his girlfriend could not tempt him to leave Stevensweert.

*When I was dating my present wife, I told her plainly that I would never consider leaving Stevensweert! 'You can come to Stevensweert, but we will never move to Maasbracht, Echt or any other place than Stevensweert.' I am proud that I was born in Stevensweert. Likewise, I am proud that my daughter is born here. We are the genuine guys of the village. We go for it!*

The strong connection of the born islanders is also seen as a reason for the reticence towards outsiders (Van Lankveld, personal communication, March 20, 2015). Some of the respondents indicate that the mentality of the outsiders is not compatible with the prevailing culture on the island. Statements like 'Newcomers are often trying to predominate' and 'Troublemakers will be gone soon' outline the suspicious attitude towards outsiders. Following from this reticence towards newcomers, it is not strange that some of the 'newcomers' indicate that it is very difficult to become a part of the community. Whereas some do not perceive this as a problem, others would like to become more involved in the community. As one respondent aptly puts it: 'You can do whatever you want, but you will always remain to be an alien.' Possibly, the less strong connection with the villages and the people on the island are the reasons that some of the respondents who have not been born on the island do not perceive themselves as islanders.

*I live here for four years now. You are calling this an island, but I do not have the feeling that I am living on an island. It does not feel like that. We are just living on a nice spot along the Meuse River with marinas and boats, which is very nice.*

### 5.2.2. PERCEPTIONS ON THE MEUSE RIVER AND THE ISLANDS' NATURE

For many people from Stevol, the Meuse River is an essential part of the physical environment. Most of the respondents clearly indicate that the river is very important for them. A kind of pride of the River can be found in the answers of the different respondents. For many people, the Meuse is more than just a river. As this subsection will argue, the Meuse is also seen as a meeting place, a source of

inspiration and a place for leisure. All respondents from the Meuse-Island appointed the Meuse River when they were asked to tell about positive qualities of their physical surroundings. In general the Meuse is perceived as a blessing rather than as a threat. Next to the positive feelings that are raised by the Meuse River, people from Stevol perceive the nature they live in positively too. A study commissioned by the nature management organization 'Natuurmonumenten' (Service Check, 2014) indicates that the nature on the Meuse-Island is appreciated very positively. The average mark given by visitors of one of the nature areas on the island is a 7,6 (scale 0-10). People who participated in this study indicated that they visit the area for rest and leisure. The freedom and the wander nature are the main reasons for people visiting the nature areas. A respondent from Ohé en Laak who lives on the island for three years clearly appoints his attachment to the environment: *'I feel like I am on holiday all year long.'* Even though many people from Stevol got accustomed to their environment, they are regularly reminded of the uniqueness of their landscape by the tourists and visiting friends and family.

*When family or friends are coming to visit us, they always envy us for the beautiful place we live. They help us reminding that this place is unique. The Meuse, the freedom and the space we have are very valuable to us. Fortunately not much can be changed here. On both sides we are enclosed by the Meuse and due to the beautiful nature and the river the landscape will not be ruined.*

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The last sentence of the quote above is very characteristic for how people on the island perceive the environment. Due to the existence of water, nature and the limited remaining space, the municipality of Maasgouw is very hesitant in providing construction permits. In general this cautious attitude is appreciated by the people from Stevol. As some of the respondents argue: *'One should not be messing around too much with the landscape.'* Nevertheless, some entrepreneurs on the island have the feeling that opportunities are missed when regulations by the municipality, the water board and Rijkswaterstaat are applied too rigorously. An example given by respondents representing the recreational boating group is the absence of mooring facilities in nature areas. According to an entrepreneur, economic changes for entrepreneurs are missed, because other locations have more to offer to their tourists. Even though the tourist entrepreneurs also agree that some reserve in modifications of the landscape is needed, they demand some more flexibility. According to a campsite owner a win-win situation can be achieved when small adjustments are allowed by the authorities.

Another interesting distinction in the perception of the Meuse-River can be made based on the experiences with flooding. Even though all respondents perceive the Meuse as a blessing, rather than as a threat, people who experienced the shock events of 1993 and 1995 are also aware of the impact that a flood can have. Next to the positive experiences, some of them also indicate that they are aware that a new flood is not impossible. Amongst the respondents of this group, a certain degree of respect for the strength of the river can be found. This does not necessarily mean that these people are afraid for a flood. As a woman aptly summarizes: *'We highly appreciate the natural dynamics of the Meuse, which also means that we will not always be able to control the river.'* Even though the respondents who did not experience the shock events of 1993 and 1995 also appreciate the natural dynamics of the river, a high degree of controllability is assumed by some of these people. As one of the respondents strikingly puts it:

*When I bought this house, I did not even consider that a flood could occur at this place. Even though I am informed now about the floods of some decades ago, I cannot imagine that a flood can happen again at this place. Otherwise they would not be allowed to sell this house, right?*

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The quote above indicates that this respondent has a strong belief in the manageability of the Meuse. In other words, he says that a flood is something of the past and will no longer happen. Apparently, some of the people moving to the Meuse-Island are only aware of the opportunities of living along the Meuse River. Yet, the opportunities of living in the riverbanks are not only seen by the new inhabitants of the Island. All respondents appoint opportunities like a special place for living, walking, cycling, swimming and sailing. Nevertheless it seems that the opportunities offered by the physical environment are even more important for people who chose to move to the island. This is also very plausible as the different opportunities may act as attractors for people who have not been born on the island.

Next to the sentiments related to the Meuse, the river is also seen as a meeting place. Particularly the elderly indicate that they perceive the Meuse as a meeting place too. 'When there is local news that needs to be spread, this happens at the guardhouse' according to one of the older respondents. For this people the Meuse is an interesting meeting location as the river keeps fascinating the people. According to them, you can never get bored by the river. The fascination turns into excitement when the water levels are rising. During periods of high water, much more people than just some elderly people are coming to watch the river. These social and unifying experiences are very valuable for many inhabitants of Stevol. The excitement and the social function of the Meuse as a meeting place are strikingly described by an older male respondent from Stevensweert.

*People from the village are always attracted by the Meuse. There is always something to see and during periods of high water it is very exciting. When the water levels rise, everyone comes to have a look at the river. People are lying then. Do you know what that means? ... People are telling great tales and they sharply exaggerate about the observed water levels. That makes things even more exciting.*

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### 5.2.3. SENSE OF SECURITY

Feelings of (in) security are not necessarily representative for the factual situation. Yet, the feelings of security might be important in the water awareness and water behaviour of people on the Meuse-Island. As argued in the previous subsection, all respondents in Stevol were predominantly positive when they were talking about the Meuse-River. The Meuse is perceived as a place for leisure, beautiful living and social interaction. This subsection intersects the previous one as it aims to give an image on feelings of safety by people from the Meuse-Island. The fact that the respondents are predominantly positive when talking about the Meuse-River already reveals a bit on the sense of security of the respondents from Stevol. As this subsection will argue, people on the island feel rather safe and are not daily preoccupied with the idea of a flood. Yet, this does not mean that people on the Meuse-Island do not have a sense of security. A member of the volunteer fire department from the island aptly touched upon this by comparing water safety with fire safety.

*People are not daily occupied with fire safety. After buying an extinguisher and a fire blanket, they just go on with their lives. The same applies to water safety. People might adopt some measures and simply continue their everyday life afterwards.*

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As already mentioned in the previous subsection, it seems that experience with water is an important aspect in how one perceives risks. Even though the number of respondents does not allow us to prove this link, it seems plausible that experience can help people in judging their situation. This presumption is also confirmed during the interviews with inhabitants from the Meuse-Island. Whereas questions on how safe people are feeling were answered extensively by people with

experience, people without experience sometimes indicated that they never even considered the risk of a flood. An example of someone without experience was also provided in the previous subsection in which the interviewee indicated that he could not imagine that a flood would occur. In contrast, the respondents who experienced the shock events of 1993 and 1995 mostly indicate that even though water safety is not a daily topic, they all keep in mind that a new flood is not impossible. As Sanders (personal communication, February 20, 2015) argues: *‘when the water levels rise, people from the village start looking at the water levels on the internet or TV’*. This reaction of keeping an eye on the water levels denotes some awareness of risks. *‘People who experienced a flood before do not plainly assume that a flood will never happen again.’*

The experience with water does not necessarily date back to the shock events of 1993 and 1995. Professional or personal experiences with water can also help people in developing a perception of the risk that they are exposed to. An example of professional experience is given by a farmer. As he has some outer dike pastures, the farmer is very much aware of the power and the subsequent damage of the Meuse. Other examples of personal experiences are given by a nature manager, a yachtsman, a water board employee and the marina administrator. As a result of their personal and professional experience, these people seem to be very well aware of the risks they are exposed to. An example of this ‘respect’ for the river is given by the administrator of a marina on the island.

*The power of the Meuse can be very impressive. It intrigues me quite a bit. Yet, I think that one should not underestimate the power of the river. In wintertime people sometimes want to navigate the river without considering the risks involved. Their outboard engine is often not strong enough to sail back against the flow. People underestimate that risk. You must have respect for the river, right?*

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The ‘respect’ of the Islanders for the power of the Meuse River, does not directly imply that people do not feel safe. In general the respondents feel very safe and do not worry very much about their water safety. Most of the inhabitants indicate that they perceive the risks they are exposed to as very low. An important reason for this perception seems to be the knowledge of possible water levels. According to some of the interviewees, the water can never reach life-threatening water levels. This knowledge seems to be an important reason for people from the Meuse Island for not having to worry too much. Another explanation for a low risk perception is the attitude towards floods. A more detailed description of the attitude will be provided in Section 5.4. Next to this attitude, the measures taken after the shock events of 1993 and 1995 seem to play a role in the risk perceptions of the interviewees. It seems that the levees provide a certain feeling of security. This safe feeling provided by the levees is strikingly described by a respondent living along a levee.

*After the flood of 1995 they constructed some beautiful broad levees. These protection measures give me a good and safe feeling. Another advantage is the fact that the water level will never be extremely high on the island. The lives of the Islands’ inhabitants are not in mortal danger when the area gets flooded. At this place our feet get wet at most.*

~~~~~

One’s sense of security cannot be easily calculated by asking people about their experience with- and knowledge- on water. As also argued in the theoretical framework in Chapter 2, people with similar background can respond very differently to similar situations. As argued by the theory, the degree of prevention-orientation can vary considerably between different people. Whereas one is very ambitious to prevent his or her household at all costs against the impact of the flood, the other is more laid back and does not so much worry about the potential consequences of a flood. A very striking example on different risk perceptions is given by an inhabitant of the historical centre of

Stevensweert: *'As I was pulling weeds, my neighbour was carrying sandbags to his house.'* As this degree of prevention-orientation is very different, it is practically impossible to describe the sense of security on the Meuse-Island. Yet, some important indicators that seem to influence the sense of security can be identified. First, the experience with water seems to be important in the construction of a risk perception. Due to experiences, people on Stevol are better able to estimate the risks they are exposed to. Secondly the attitude and knowledge of an individual seem to influence the sense of security. Last, the levees that are constructed after the shock events of 1993 and 1995 contribute to the safety feelings of people from the Island.

### 5.3. COGNITION

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In this section the second dimension of water awareness will be described and analysed. As argued in Chapter 2, the cognitive dimension entails the individuals' access to knowledge and information about the environment (De Boer & Huitema, 2003). Due to the so-called cognitive anxiety, people are enabled to ask rational questions on the possibilities of full manageability of natural disasters. When individuals are able to ask such questions, they are able to examine their safety and develop an awareness of vulnerability. In the first subsection the knowledge that people have in general will be described. The second subparagraph will touch upon the importance of experience and on learning by experience. The third subsection will try to outline how the local knowledge and experience can conflict with expert knowledge. Finally the last subsection will summarize the role of the cognitive dimension in the water awareness of the inhabitants of the Meuse-Island. As mentioned before, it is not possible to describe the role of the dimensions for all people in Stevol. First, the number of respondents does not allow us to generalize. Secondly, the role of the different dimensions can vary widely amongst the inhabitants of the Meuse-Island.

#### 5.3.1. THE NEED FOR INFORMATION

Quite a number of respondents indicated that they do not have the feeling that they have substantial knowledge on water and water safety. Yet, this is not seen as a problem by most of them as they mostly indicated that they do not have the ambition to know much more about water safety. As also argued in the previous section, all the interviewees feel rather safe and they do not believe that the chance of a flood is very high. This low perceived risk seems to be an indicator for the limited knowledge and information seeking behaviour. As some respondents indicated, they do not feel the need to look for information about water safety as they trust that the flood defences on the island are functioning well. Some of the respondents also indicate that they fully trust the expertise of the water board which makes it useless for them to learn more about water safety. However, not all of the respondents are fully convinced by the expertise of the water authorities. This friction between the knowledge of local inhabitants and the expertise of the water authorities will be further described in Chapter 5.4 on aspiration and the third subsection of this Section (5.3.3).

An interesting source of information in a small community like Stevol is the oral distribution of information. As a result of the measurements done by the water board, quite a number of people know that the water board is planning to work on the levees of the Meuse-Island. Especially the respondents who are more engaged in the community of the Meuse-Island already knew that levee reinforcements were planned by the water board before this was communicated by the water board Roer en Overmaas in the local media. Due to the somewhat contradictory information that people have, some of the more locally engaged people indicate to be worrying about the measurements that will be taken by Roer en Overmaas. An example of someone worried is a respondent living on a

levee in Ohé en Laak. After some measurements that were done close to his house, he did not receive any other information on the planned reinforcements of the levees.

*I know that the Water board is planning to strengthen the levees or something like that. A year ago someone visited me to measure and to inspect the levee. Afterwards I didn't hear anything, so I don't know when the levees will be strengthened. It would be nice when they tell me what they are planning to do and provide me with some more information. What do they want?*

~~~~~

A profound knowledge on the water system was found amongst the respondents with a professional relation with the water system. Information and knowledge on the water system are essential for these people to perform their jobs successfully. Two examples of inhabitants with a more profound knowledge are an administrator of the marina and a manager of a nature area on the Meuse-Island. Both of them indicated that they regularly check the water levels on the website of Rijkswaterstaat. The information on the water levels in Borgharen, the place where the Meuse flows into the Netherlands, is essential for these people in order to successfully perform their adaptation strategies. While the marina administrator exactly knows at which water level in Borgharen the marina needs to be evacuated, the nature manager exactly knows the water level at which the wild horses and cattle need to be moved to the inner dike area. Yet, these are just two examples on the professional knowledge by some of the islands' inhabitants. In summary, these people have a very detailed knowledge on how the water system on the island works which enables them to respond strategically to the natural dynamics of the river.

In general it seems that the people from the Meuse-Island know about the basics of water safety in their area. When the respondents were asked about their knowledge on water safety, most of them were able to tell something about flood risks and how the water flows during periods of high water levels. In this sense it seems that the people from the Meuse-Island somewhat underestimate their knowledge on water safety. As water is an integral part of the lives of people from Stevol it is plausible that people gained their knowledge over the years and are not very aware of it. Some of the respondents were also able to provide some information on some more complicated characteristics of the Meuse River. Sources of information are newspapers and information letters from water authorities. Especially the older people seem to be interested in these kinds of information. This presumption is confirmed by Satijn (personal communication, March 6, 2015) as she claims that the elderly people in Limburg are often very proud on the Meuse River and are very interested in all kinds of media that informs them on the water system in their region. Next to different kinds of media, experience is an important aspect in the knowledge of many inhabitants from the Meuse-Island. Some of the lessons learned by experience will be outlined in the next subsection.

### 5.3.2. EXPERIENTIAL EXPERTS AND THEORETICAL EXPERTS

Experience with the Meuse River is an important source of knowledge for people living on the Meuse-Island. In the previous section (5.2), it was described how experience can influence the affective dimension. Feelings of safety are largely influenced by previous experiences with water. This section argued that 'experiences with the water system can help people in developing a perception of the risk that one is exposed to'. Yet, this development of a risk perception is already having a cognitive dimension as experiences with water help people to better understand the water system. It seems that these experiences are very important for some of the inhabitants of Stevol. This experiential knowledge does not always seem to be compatible with the water technical approaches applied by the water authorities. For inhabitants of the island it sometimes seems that

the water managers speak a different language. This gap is also indicated by Satijn (personal communication, March 6, 2015) who argues that the technical jargon is often hard to understand for inhabitants who are confronted with new water safety measures.

*The gap between the old lady visiting an information meeting and the engineer calculating the water levels is enormous. Notions like 'downstream effects' already ask for some more explanation. A river discharge of 3000 cubic meters each second is very hard to imagine. By comparing this discharge with a 5-story apartment, a layman will be able to form an idea what a 3000 m<sup>3</sup>/s discharge means.*

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The notion of the big gap between the engineer and the local resident does not mean that the local residents have no knowledge on the functioning of the water system. Some of the respondents are perfectly able to tell what the water will be doing at certain water levels. For example the shock events of 1993 and 1995 learned the inhabitants a great deal on how the water behaves at very high levels. Most of the respondents were able to describe which areas were flooded in these periods. This experiential knowledge of people from Stevol can be a reason for people from the island for not understanding water safety measures of water authorities. As some respondents indicated, they do not understand why some of the levees were constructed after 1995. Since an inhabitant observed that the water did not even reach the place where the levee is located, this respondent cannot imagine why the water authorities are planning to reinforce the levees on the Meuse-Island. The different approaches of the water system are strikingly described by a respondent from Ohé en Laak in the quote below. As this quote reveals, this man wonders if his observations from practice are compatible with the calculations made by the technical experts.

*They are theoretical people; I'm a man from the field. Do you understand? I'm here every day and I see exactly what is happening in this area. An engineer who is designing a levee is relying entirely on calculations. It might be a good way, but you should keep in mind that I see what is going on here.*

~~~~~

In this quote, a light suspicion towards the knowledge and expertise of the water authorities can be found. This suspicion was found amongst a few more respondents. Yet, none of them fully neglects the expertise of the water authorities. They rather have a critical point of view towards some of the methods and calculations used by them. Especially flood risks are perceived as highly contested by most of the respondents. It seems that the numbers provided by the water authorities are in contradiction with the experiential knowledge of the inhabitants living on the Meuse-Island. Even though flood risk calculations like risk of 1/50 might be right from a theoretical point of view, calculations like this seems to evoke resistance. As many of the islands' inhabitants experienced two floods in a bit more than a year, these types of calculations are meaningless for quite a number of people from Stevol. Due to the experiential knowledge, the inhabitants are very much aware of the unpredictability of the Meuse-River. This perception of limited manageability of floods can also be found in the following quote by a respondent who experienced the shock events of 1993 and 1995.

*I don't believe the risk calculations by the Water board and Rijkswaterstaat. What is the meaning of a flood probability of 1/50 or 1/250? I don't believe in rubbish like that. How could one be able to calculate what the river will be doing? Nature is not as predictable as suggested by those numbers.*

~~~~~

Even though quite a few respondents are very sceptical on the calculation methods for flood risks, most of the respondents have a positive attitude towards the water authorities. The next section



aims to touch upon this aspiration and attitude of individuals. As this section will argue, this aspiration is also influenced by the experiential knowledge of individuals living on the Meuse-Island.

#### 5.4. ASPIRATION

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In this section the third and last dimension of water awareness will be touched upon. The aspiration of an individual is about the attitude and willingness regarding water aware behaviour. Like the dimensions of cognition and affect, aspiration is socially differentiated. Whereas one individual is very much focused on preventing him or herself from negative impacts of floods, other individuals prefer to focus on maximizing their opportunities. Another important notion is that one's aspiration could change over the years. After the floods of 1993 and 1995 the aspiration to protect Limburg from flooding was much higher than it is now (Inckel, personal communication, February 12, 2015). Tonneijck (personal communication, January 19, 2015), a former technical manager at Rijkswaterstaat strikingly describes how he and his colleagues were welcomed at informational meetings after the floods.

*Rijkswaterstaat employees were welcomed in Limburg as liberators. After finishing our technical studies, we've been organizing 13 informational events to present the solutions we've been working on. Our solutions were welcomed with the greatest pleasure by almost all of the inhabitants from Limburg. Protecting the province against floods was seen as the first priority.*

~~~~~

This section aims to describe the aspiration of the people from Stevol in three steps. First the personal and communal aspirations will be described and analysed. This subsection also aims to analyse incompatibilities between these two interests. The second subsection will analyse the sense of responsibility regarding water safety. Finally the third subsection aims to provide more insight in the attitude of individuals towards water authorities. This section will look for an answer on how people from Stevol feel that their interests are taken into account by these authorities.

##### 5.4.1. PERSONAL AND COMMUNAL INTERESTS

According to Duisings (personal communication, February 12, 2015), water safety does no longer prevail over other spatial interests in Limburg. Comments on new projects like '*do we really need this?*' or '*is it worth the cost?*' are no exceptions. The reinforcement of levees is often not seen as a priority by the citizens of Limburg. This low priority is not only noticed in Limburg. According to De Boer and Huitema (2003), the lack of water awareness is a nationwide societal issue. Inckel (personal communication, February 12, 2015) argues that flood defences are not useful for the bulk of the time. Therefore the levees are most of the time seen as a barrier and overdone. Yet, very rarely people praise the presence of flood defences during periods of high water. Due to this

Since the inhabitants of the Meuse-Island perceive the risk of flooding as low, similar questions as appointed by Duisings (personal communication, February 12, 2015) were asked by the interviewees on the proposed levee reinforcement on the Meuse-Island. In general, the respondents had no strong negative or positive attitude towards the interventions in the landscape. The importance of water safety is endorsed by most of the respondents. Yet, the so-called MIMBY-effect (*not in my backyard*), seems to apply very well on the Meuse-Island. All interviewees who did not feel negatively affected by the proposed levee reinforcements had a benevolent attitude towards the planned improvements. The attitude of people who felt that the proceedings or the higher levees might influence them negatively was somehow different. Whereas some of them doubted the need of the new reinforcements, others mainly indicated that they feared for the negative consequences

of the proceedings or the higher levees. An example of a respondent who fears the negative consequences of the proceedings is a tourist entrepreneur whose business is located along a levee on the island. Experiences with previous modifications of the landscape taught this entrepreneur that his revenues will decline when nuisances of the workers will accompany the reinforcements.

*I have my own business here alongside the levee. It cannot be that the proceedings will take place during the summer. My guests will suffer a lot nuisance of the machines. When bulldozers, cranes and compactors are used, I will lose my guests soon. These people are coming to enjoy the nature and have their rest. Proceedings on the levees can kill my business.*

~~~~~

Next to the more practical differences in interests, some emotional reasons for not letting water safety prevail were found too. As described in Section 5.2, people from the Meuse-Island highly appreciate the environment and have a rather conservative attitude towards interventions in the landscape. Sentimental values like a beautiful view, a traditional landscape layout and a preservation of the natural character seem to be important to quite some respondents. Especially the people living close to the levees have a somewhat conservative attitude towards the planned interventions. Higher levees and other flood defences can influence the earlier described appreciation of the landscape. Yet, the fact that the natural character is very important for quite a number of inhabitants from Stevol does not mean that working on water safety is seen as utterly useless. Nevertheless, a low perceived risk combined with a high appreciation of the present landscape results in a low perceived importance of water safety measures for a number of interviewees. Another indicator is the trust that people have in the water authorities. Section 5.4.3 will touch upon the trust of inhabitants towards the water authorities.

In addition to the interviewees with a somewhat conservative attitude towards new water safety projects, a few sources indicate that some of the people from the Meuse-Island assign a high priority to increasing the water safety on the island. These people seem to be more prevention-oriented than most of the people from Stevol. Logically, most reasons found for a high assigned priority to water safety are based on previous experiences with floods or seepage water. An example of an inhabitant with a very strong orientation on prevention was given by Lankveld (personal communication, March 20, 2015).

*A man from the centre of Ohé en Laak started a legal process against an entrepreneur from his village. The entrepreneur applied for a license to build a parking lot in the outer dike area for his guests. The planting of some hedges were included in this application. According to the complainant, planting hedges in the outer dike area could block the water of the Meuse at high discharges which in turn decrease the water safety levels for the inhabitants of Ohé en Laak.*

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It is interesting to note that the complainant suffered a lot of damage during the floods of 1993. Whereas most of the inhabitants of the village just had a little bit of water in their houses, the basement and ground floor of this man was fully submerged during the flood of 1993. It seems this shock event strongly influenced the prevention-orientation of this man. By litigating against the planting of hedges in the outer dike area the complainant seems to represent his own interests. For this man the priority of water safety is very high as he is committed to prevent himself from another flood. In contrast to most of the people, this individual does not mind when the levees in his backyard are strengthened (Please in my backyard).

The attitude of people from Stevol seems to be strongly influenced by the personal interests of these people. Briefly three groups can be identified from the interviewees based on their attitude towards water safety and new levee reinforcements to be executed. The first and biggest group, is the group of the people who do not feel directly influenced by the flood defences and new projects. In general these people trust that the water authorities are representing their water related interests well. Therefore these people are mostly sympathetic towards new water safety projects. The second group is a group who is less sympathetic towards interventions in the landscape. As these people mostly indicate, they doubt the need to improve the flood defences. It is remarkable that all people from this group have practical or sentimental concerns regarding new water projects. Thirdly, a prevention-oriented group who is very much supporting the reinforcements of levees on The Meuse-Island can be identified. These respondents have had some negative experiences with floods and seem to look for opportunities to prevent themselves against another flood. As mentioned before, the attitude of the interviewees seem to be strongly influenced by their personal interests and experiences. Yet, it is important to note that it is impossible to determine the attitude of an individual based on some expected interests. The individual values can be very personal and these values are not necessarily rational. The perceptions of risks and opportunities vary highly amongst individuals. Furthermore the magnitude of this research does not allow us to generalize on the whole population of the Meuse-Island or South- and Central- Limburg.

#### 5.4.2. SENSE OF RESPONSIBILITY

In contrast to the very varied personal interests, the sense of responsibility seems to be more univocal. Nearly all interviewees indicated that they feel responsible for their own safety to a certain extent. Only a single respondent who did not even consider the risk of a flood at all indicated that he had no reason to feel responsible for his safety. When the respondents were asked in which way they felt responsible for their safety, they mainly refer to the levees on the island. From the answers given by the interviewees, a certain degree of respect for the flood defences can be derived. It seems that people are aware of the status of the levees and understand the importance of the flood defences. Some of them indicated that they feel responsible for the quality of the levees and as needed they will inform the water authorities on damages to the dike. An example of this sense of responsibility which was found amongst most of the respondents is given by an interviewee from Stevensweert. This quote and similar answers indicate that people in Stevol seem to be involved in their environment and feel responsible too.

*Yes, I feel responsible for the water safety in this area. I will never dig a hole in the levee and I respect the position of the levee. I also consider the maintenance of the levee as a responsibility. When I observe an abnormality, I will definitely inform Roer en Overmaas. I am in close contact with some of the staff members.*

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Even though most of the interviewees perceive the risk of a flood as very low, quite some of them indicate that they would definitely stand up for their rights if they have the feeling that the water safety levels are too low. However, most of the people have the feeling that they are well protected by the levees and other measures executed by the water authorities. Therefore most of the respondents ascribe most of the responsibility regarding water safety to the water authorities. This ascribed responsibility is rather natural as the authorities are obliged with the task to protect the people on the island from floods. The enormous magnitudes of these water safety projects also make that people feel rather forceless to prevent themselves from floods. As some of them indicated, they

are not able to protect themselves from floods. However they can take measures to reduce the impact of a potential flood.

Like the in dimensions of cognition and affect, experience with water seems to be important in order to understand ones sense of security. People who experienced floods seem to have a greater sense of responsibility. Moreover, respondents with professional experience and expertise concerning water seem to feel even more responsible. Next to this feeling, people with professional experiences feel less forceless to apply adaptation strategies. An example of this professional experience is the administrator of the marina from Stevensweert. His experience with and knowledge of water makes him feel responsible to advise the owners of the boats on adaptation strategies. Due to this sense of responsibility, the administrator advises the recreationists on water levels and how to prevent their boats and other assets from damage.

#### *5.4.3. TRUSTING THE AUTHORITIES*

Even though the previous subsections already touched upon the attitude and trust of people from Stevol towards the water authorities, this subsection will provide a more detailed description and analysis on the people's trust in the water authorities. As mentioned before water safety does no longer prevail over other spatial interests in Limburg and other regions in the Netherlands (Duisings, personal communication, February 12, 2015). Therefore it seems that it is no longer taken for granted that people trust that the water authorities represent the interests of the people from the Meuse-Island well. Yet, a somehow differentiated image was found amongst the respondents. Whereas some people fully trust in the expertise of the water authorities, others doubt the approach which is applied by the authorities. Nevertheless some studies also indicate regional trends in the trust of people from Limburg regarding the authorities.

Compared to other Dutch provinces, the trust of people from Limburg in the authorities is significantly lower than the trust of people in other provinces (Schmeets, 2014). This lower trust is found in all levels of government. A frequently used explanation for a higher degree of distrust in the authorities is the distance to the central government in The Hague (Bovens & Wille, 2006). With distance to The Hague, Bovens and Wille (2006) do not refer to the physical distance to The Hague only. Even more important is the psychological distance between Limburg and The Hague. Many people from Limburg have the feeling that policies from the central government are focusing on the economic centre of the country. Therefore policies from The Hague are often welcomed in the province with some scepticism (Bovens & Wille, 2006). Moreover, the feeling that Limburg is used as an extraction area for natural resources is shared by many people living in South and Central Limburg. Especially the gravel extractions of the past centuries contributed to this perception (Inckel, personal communication, February 12, 2015). Even though most of the respondents from the Meuse-Island were not able to indicate where their distrust comes from, a somehow suspicious attitude towards the authorities was found amongst the interviewees. Even though the magnitude of this study does not allow us to make claims on the general attitude of people from Stevol, it seems that a substantial degree of distrust in authorities is present on the Meuse-Island too.

In general the respondents had a somewhat mistrustful attitude towards the authorities. Nevertheless most of them also indicated that they fully trust the expertise of the water authorities. Yet, trusting the expertise of the water authorities does not mean that these people also fully trust the projects and the objectives of the water authorities. As some of the respondents indicated, they have the feeling that the water projects in Limburg are largely a result of economic objectives. It seems that these respondents used the example of the '*Grensmaas project*' to build this argumentation. This project is budget neutral, which means that the costs of deepening and

widening of the river is financed by the benefits of the gravel extractions. Even though the reinforcement of levees on the Meuse-Island is not budget neutral, some of the respondents are rather suspicious as their trust in (water) authorities is low. This suspicion is found amongst most of the respondents. Due to for examples incomprehension of citizens regarding certain water projects, people are inclined to question the objectives and the working methods of the water authorities. An example is a respondent who comes up with an example of a flood defence in Venlo. Even though Venlo is not a part of the administrative area of Roer en Overmaas, similar examples of perceived failures of water authorities seem to influence the trust of individuals strongly.

*I think the water authorities don't know exactly how to calculate the flood opportunities. What else would be the reason for changing a quay- wall in Venlo for three times? Imagine that all work is done like that. If you build a house, you will not rebuild the foundation three times. That is simply impossible. So are the calculations of the water levels: it's entirely incorrect.*

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Another source of suspicion is related to potential conflicting interests between water safety and personal or professional interests. These people are not necessarily mistrusting the need to improve the levees on the island. They rather fear that they will become victims of the measures for flood protection. Especially people living close to the levees seem to be more suspicious towards the water authorities. This attitude is also found in their need for information. Whereas the respondents who are living in the villages Ohé en Laak and Stevensweert are mostly interested in the general plans for the island, people living close to the levees want to know in detail what is going to happen with the levees on and close to their lands. Again the NIMBY-principle seems to apply. The chance that the water authorities will be changing the landscape they are experiencing everyday makes that these people are more suspicious and willing to stand up for their own interests. An example of the need for detailed information is given by an entrepreneur from Stevensweert. Due to his work in the touristic sector and his business close to the levees he is very interested in the detailed plans of the water board.

*I'm very eager to know more about the reinforcements of the levees. Since I'm working in the touristic sector, it's important for me to know what is going to happen and when these reinforcements will be executed. It would be a disaster if all my guests will be turned out by the big machines.*

~~~~~

Even though this subsection gives a somewhat negative impression on the trust of people from Stevol towards the water authorities, a few respondents indicated that they fully trust the water authorities and their objectives. From their answers, a certain degree of respect for the magnitude of the water projects in their region was found. The fact that the water authorities are able to implement water projects of these magnitudes seems to give these people the trust that the authorities have enough knowledge and expertise to protect them from floods. Next to the trust as a result from the 'Grensmaas' and 'Zandmaas' project, some respondents also indicated that they trust the authorities without being able to provide reasons for this trust. It is remarkable that the people who did not give a reason for their trust also indicated that they do not feel responsible for their safety in any way (Section 5.4.2). It seems that people who do not feel responsible for their safety fully trust the authorities in order to pass their responsibility. By doing so, there is no reason to worry about water safety as the authorities are responsible and able to work on water safety.

In this subsection, the trust in (water) authorities was discussed. Remarkably, it seems that the trust of individuals in the water authorities does not necessarily reflect ones awareness of risks. People



who were better informed seem to have a more critical attitude towards the authorities than people who were not. Most probably a link with the earlier described sense of responsibility can be made. People who feel responsible have ideas on how water safety projects on the Meuse-Island should be performed. In return, people who do not feel responsible seem to care less about water safety at all. Therefore these people seem to have no problems in fully trusting the authorities.

## *5.5. CONCLUSIONS*

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In this chapter, the water awareness and numerous factors influencing water awareness have been described and analysed. First of all justice was done to the temporal dimension of water awareness. Events and behaviours of the past are important in order to understand how water safety is perceived today. Following the historical analysis, the data on the present water awareness on the Meuse-Island was described and analysed. In order to do so, the dimensions affection, cognition and aspiration were used. In this section, the most important conclusions of this chapter will be repeated in order to answer the question on how water awareness on the Meuse-Island is formed.

### *5.5.1. WATER AWARENESS AND THE MEUSE-ISLAND HISTORY*

As the historical analysis revealed, water and accompanying pros and cons has been of great influence on the Meuse-Island for centuries. Whereas fertile soils and a good location from an economic and political point of view offered many opportunities to people from the Meuse-Island, floods were perceived as serious threats by the inhabitants from Stevol. An example of this threat was provided by a letter of Mr Indemans after a flood in 1880. As Mr Indemans indicated in his letter, the island was like a big sea and he doubted if he and his family would be able to remain on the Meuse-Island. Economic losses and strong disturbances resulted in challenging living conditions for people on the Meuse-Island. However, the floods resulting from living on the Meuse-Island never resulted in a depopulation of Stevol. Due to new technologies, the people from the Meuse-Island were increasingly able to avoid harm. Whereas all crops of farmers were destroyed after a flood in the late 19<sup>th</sup> century, economic losses resulting from floods were of much lower intensities in the 20<sup>th</sup> century (Rutten, personal communication, March 6, 2015). In the late 20<sup>th</sup> century, water from the Meuse still caused nuisances on a regular base, but the gravity of these nuisances were much lower than nuisances in the 19<sup>th</sup> century.

Following the experience of many people from the Meuse-Island, it is no surprise that the shock events of 1993 and 1995 were perceived as nuisances rather than as floods. As the people from Stevol managed to prevent breaches in the levees, the damage suffered in 1993 and 1995 was limited. This perception also fits in the growing feeling of controllability and manageability. Whereas people in the 19<sup>th</sup> century had limited opportunities to avoid harm, levees and modern technologies supported the people from Stevol in preventing themselves from a flood. This feeling of controllability can also be perceived in at the shock event of 1995. Even though the mayor of Maasbracht advised the islands' inhabitants to evacuate for several times, many people choose to put aside these serious warning as they did not perceive the situation imminent enough to participate in the evacuations. Following the insights from the events of 1993 and 1995 it can be concluded that the risk perception is on the decline for many years. As this section will also argue, it seems that the awareness of threats is even more declined nowadays as some people do not even take into account the possibility of a flood.

### 5.5.2. *PRESENT-DAY WATER AWARENESS IN STEVOL*

Next to lessons from history, this chapter also focused on the modern water awareness of people on the Meuse-Island. The dimensions affect, cognition and aspiration were used to study the role of water safety for people living on the Meuse-Island. In this subsection, the conclusions of these three dimensions will be summarized and relations between the different dimensions will be discussed shortly.

The affective dimension is strongly represented in the Meuse-Island. As different sources of data elucidated, most of the people from Stevol feel a very strong connection with their environment. Yet, the feeling of 'native' people from Stevol and people who have not been born on the island is somewhat different. Whereas the 'native' islanders mainly focus on their social and cultural attachment with the island, 'newcomers' mostly refer to the attractive physical environment on the Meuse-Island. Yet, all respondents indicated that they feel very much attracted to the Meuse River and a kind of pride related to the river was found. Most of the respondents clearly have a positive feeling towards the river and the water on the island. As they indicated, the delight and advantages of living on the island outweigh the threat of a potential flood. When people were asked to indicate their associations with the river people argued that they perceive the Meuse as a place for leisure, inspiration and encounters. Potential threats were hardly indicated by people from Stevol. Following this associations, it is no surprise that people on the Meuse-Island feel very safe. This feeling seems to be primarily based on experiences of people. Whereas some people have no negative experiences with water, others indicate that they did not perceive the shock events as very threatening. Nevertheless few individuals acknowledged that they also perceive the river as a threat.

From the cognitive dimension, different sources of knowledge and information were observed. Experience with water seems to be the most important source of knowledge. As a result of observations and experiences, people from Stevol better understand the river system. Yet, the experiences that people have are not necessarily related to the shock events of 1993 and 1995. Examples of a marina administrator and a farmer were provided to show how experience could contribute to substantial knowledge of the islands' water system. Resulting from this understanding that experience is important in developing knowledge on water safety matters, a gap in the knowledge of the water system was found amongst young people and people who moved to the island after the shock events of 1993 and 1995. As some of these people indicated, they did never even consider a flood risk at the place they currently live. Next to experiences, oral distribution of information and newsletters are sources of information for people on the Meuse-Island. Strikingly the people who already know something about the water system are the ones who indicate that they are interested in these sources.

The third and last dimension of water awareness is the aspiration of individuals. As argued by the experts and observed on the Meuse-Island, the aspiration to enhance the water safety level on the Meuse-Island is fairly low. First, the fairly positive affective feelings (1<sup>st</sup> dimension) that people have regarding the Meuse River, does not result in a demand for enhanced water safety levels. As a result of these positive associations, people are more likely inclined to promote new opportunities instead of preventing themselves from threats. Secondly, the so-called NIMBY effect is important to understand the reserved attitude of people regarding water safety on the Meuse-Island. Especially the people who have the feeling that measures for enhancing the public water safety level influences their personal interests negatively are less inclined to participate in the prevention of threats. Furthermore the sense of responsibility is very different for each individual. Whereas one feels responsible for the safety of the community, others do not feel responsible at all.

As the different dimensions of water awareness have elucidated, the awareness of potential water related threats on the Meuse-Island is decreasing. Whereas water related nuisances were a part of the local agenda decades ago, the Meuse River is hardly associated to disturbances anymore. Since the experience with water is important in all of the dimensions of water awareness, it is very plausible that the awareness of threats posed by the river will further decrease in the future. The group of people who are aware of the negative impacts of the river is getting smaller and subsequently the feeling of controllability of floods is growing. Therefore enhancing water awareness of people while the flood risks are getting smaller seems to be a very difficult task. The recommendations and discussion in the last chapters of this study will further touch upon this dilemma.

#### *FURTHER READING*

Following the description and analysis of water related behaviour and the Limburgian landscape of water safety, this chapter aimed to describe and analyse how water safety is experienced by people living on the Meuse-Island. Following the insights which were gained in the last two chapters, Chapter 6 will provide the link between the behaviour, the landscape of water safety and water awareness. Thereafter, the subsequent conclusions and recommendations for policies and further studies will be provided in Chapter 7 and 8.



## 6 LINKING THE BOXES: WATER AWARENESS, BEHAVIOUR AND GEO-POLITICS

Following the Chapters 4 and 5 in which the concepts of water awareness, water related behaviour and the geo-political, social and physical landscape were studied, this chapter aims to link and analyse how these different boxes which are presented in Figure 14 are related. In this figure, the links that will be analysed in this chapter are emphasized by the red arrows. The first section of this chapter will start with the analysis if the link between the Limburgian landscape of water safety and water awareness on the Meuse-Island. The term 'landscape' in this section is broadly interpreted as it focuses on the social-, physical- and geo-political- landscape. The second section of this chapter will focus on the link between water awareness and water related behaviour. As argued before, water related behaviour cannot be seen as a direct result of water awareness. Last, the third section of this chapter will describe and analyse some processes of feedback. As this section will argue, the absence of consequences of behaviour or a low perceived impact by individuals might influence the water awareness of the individual.

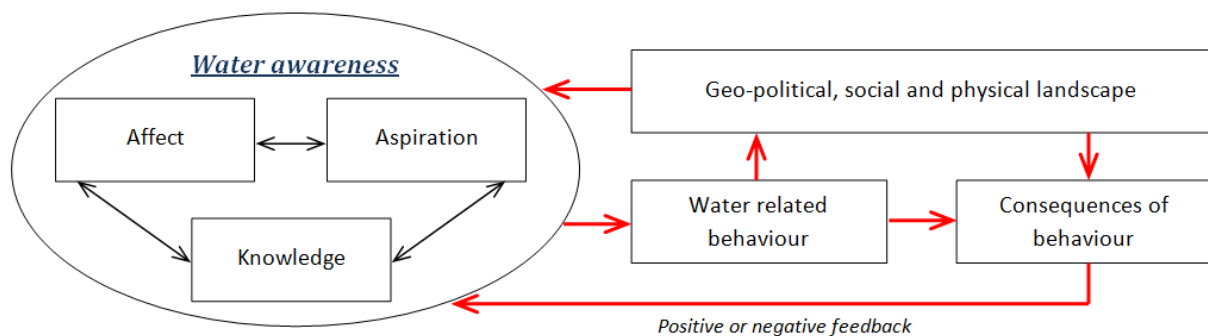


Figure 14: Conceptual model water with chapter topics in red

### 6.1. THE LIMBURGIAN LANDSCAPE AND ITS RELATION TO WATER AWARENESS

As indicated before, the Limburgian landscape in this study is broadly interpreted. In this section the social-, physical- and geo-political- landscape, and their relation to water awareness will be analysed one by one. In this section it will be argued that the low orientation on preventive actions by individuals on the Meuse-Island (Chapter 5) is largely due to the social-, physical, and geo-political landscape in South- and Central- Limburg.

Even though the link between the social landscape and water awareness does not seem to be very strong, some links were found on the Meuse-Island. The most striking examples on the link between the social landscape and water awareness can be found in the shock events of 1993 and 1995. As this events proved, the strong attachment of people to the 'Meuse-Island community' enhanced the trust of people in the abilities of the community to prevent themselves from floods. Even though the people from Stevol experienced a threatening situation in 1993 and 1995, many people indicated that they do not have anxious feelings regarding the shock events. Due to the strong cooperation of people on the Meuse-Island, great harm is prevented. Even though many people from Stevol are aware that their place is located in a flood prone area, most of them they feel rather safe partly due to strong social connections on the island.

From a physical perspective, different insights in the relation between the physical landscape and water awareness were found. Most important in contrast with other river areas in the Netherlands is the understanding that the landscape in the Meuse-Valley is very different from the polder



landscapes. Due to a more hilly landscape and the position in a valley the Meuse is streaming through, the potential inundation area in the Meuse-Valley is much smaller than the potential flood area of most other river areas in the Netherlands (Timmers, personal communication, date). In case of a flood, a relatively narrow stretch of land will be flooded. Furthermore, levees in South- and Central-Limburg are mostly not 'in use' as the water only reaches the levees at high levels. Last, the maximum water heights during a flood in most places in South- and Central-Limburg are substantially lower than the potential water levels in other Dutch regions. As a result, the probability of fatalities by a flood in the Meuse-Valley is low. Even though the risk perception of people does not necessarily correspond to the factual risks, Chapter 4 argued that most people on the Meuse-Island are very well aware that the risk of fatalities on the island is low. Following this answers, it seems that many people on the Meuse-Island have a realistic risk perception. Therefore, the outcome that people mainly experience living close to the river as a blessing rather than as a threat seems to be very admissible. In summary, the relatively limited impacts of a flood in the Meuse-Valley are reflected in the water awareness of many people on the Meuse-Island. Due to the small perceived risks, people have not much to worry about. Subsequently people are mostly focused on the promotion of opportunities, rather than focused on the prevention of threats.

Last, the geo-political landscape in Limburg is a very important factor influencing the water awareness of people in South- and Central Limburg. However, it should be acknowledged that policies in Limburg are not very different from policies in other Dutch regions as water safety policies regarding the major Dutch rivers are developed at the national level (Tonneijck, personal communication, January 19, 2015). Nevertheless, these policies have their regional effects which seem to be different from the effects of similar policies in other regions. Due to different social and physical conditions, differences in implementing water safety measures were experienced in South- and Central-Limburg. The relatively short history of Limburg and major water safety projects is an important factor. Due to this relatively short history with water safety, people in the Meuse-Valley attribute another status to flood defences than people in other river-regions (Inckel, personal communication, February 12, 2015). Whereas the status of dikes and other flood defences is uncontested in many places, many water defences in the Meuse-Valley are relatively new and do not have this uncontested status yet. An example which is shown again below was presented by Sanders (personal communication, February 20, 2015) in Chapter 4. As she argued, many people in the Meuse-Valley are not aware of what the hills (levees) in the landscape are meant for. An interesting insight that can be derived from this argumentation is that it seems that even though policies regarding water safety and flood defences changed after the shock events of 1993 and 1995, people seem not to be fully aware of the status of new flood defences.

Another important influence on water awareness resulting from water safety policies in the Meuse-Valley is the strong focus on flood protection. As the flood defences in the Meuse-Valley were not labelled as primary flood defences, enhancing flood protection levels in South- and Central-Limburg had a low priority for the national authorities. Therefore the protection levels of flood defences in the Meuse-Valley in the 1990s were much lower than they are by now. As argued before, the factual risks influence the risk perception of people. The activities of the water authorities have not remained unnoticed for almost all people on the Meuse-Island. As the water authorities in Limburg have shown that they take water safety very seriously, the people on the Meuse-Island developed an enlarging trust in the abilities of water authorities to protect themselves from floods. This trust in the abilities of the water authorities also results in stronger feelings of water safety. As argued in Chapter 5, the levees on the Meuse-Island resulting from prevention-oriented activities enhances the people's safety feelings. Based on experiences with water safety, people believe that it now takes exceptional water levels for the Meuse-Island to be inundated again. An example of a strong trust in

the flood defences resulting from prevention oriented measures was given by a man from Ohé en Laak. As this quote elucidates, flood protection measures strengthen the security feelings of this man.

*After the flood of 1995 they constructed some beautiful broad levees. These protection measures give me a good and safe feeling. Another advantage is the fact that the water level will never be extremely high on the island. The lives of the Islands' inhabitants are not in mortal danger when the area gets flooded. At this place our feet get wet at most.*

.....

## 6.2. FROM WATER AWARENESS TO WATER RELATED BEHAVIOUR

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As argued in Chapter 4, most water related behaviour can be linked to experiences of people regarding water safety. Experiences with water strongly influence the individuals' awareness on water safety matters which might result in different kinds of water related behaviour. Yet, a change in the awareness of water safety does not necessarily result in a change in water related behaviour. However, some examples show that new actions are undertaken. In this section, also some attention will be paid to the temporal character of water related behaviour. The longer it has been since the last shock event, the less people are inclined to adopt preventive measures and subsequently perform these measures.

Experience with water safety seems to be the most important factor in the individuals' water awareness. When interviewees on the Meuse-Island were asked why they participated in certain types of preventive behaviour, most of them referred to past experiences with water. Whereas these past experiences for most of the people on the Meuse-Island are the shock events of 1993 and 1995, some interviewees like a farmer and the marina administrator indicated that their awareness and subsequent behaviour is influenced by their professional experiences. As experiences taught the marina administrator that the marina will be flooded at a certain water level in Borgharen, the marina will be evacuated when this water level is observed. Due to the higher frequency of flood events for people with businesses in the outer-levee-area, awareness of water safety is stronger for these people.

In contrast to people who are more occupied with water safety as a result of their profession, awareness of flood risk for the bulk of the people is strongly influenced by the shock events of 1993 and 1995. Even though these events seem to have a contribution to the awareness of flood risks, different types of behaviour were observed. First, some people took practical measures in order to protect themselves from floods or to minimize the impact of a flood. Examples found on the Meuse-Island are the construction of tile floors, elevated constructions and the use of water proof materials. Yet, these types of behaviour were mostly performed in the first years after the shock events. No examples of similar measures which have been performed in the past few years were found. Secondly, the shock events of 1993 and 1995 changed the structural behaviour of some individuals. As the shocks awakened the awareness of people that a flood on the island might occur, some of the interviewees indicated that they started to keep track of the water levels. Whereas this practice was done on a daily base shortly after the shock events, most respondents who perform this type of behaviour indicated that the frequency of keeping track of the water levels has sharply reduced. Again the temporal dimension seems to be an important factor in the awareness and related behaviour of individuals. When feelings of insecurity drop, people are less occupied with water safety and feel no need to participate in preventive measures. Third, the example of 1993 and 1995 elucidates that despite the threat that people were experiencing, no actions were undertaken by some individuals after the shock events. Whereas some of the interviewees indicated that the events

did not feel like a threat to them, others indicated that they had no idea on how they could better prevent themselves from flooding. Following this argumentation, it can be argued that a higher awareness on the flood risks on the Meuse-Island does not necessarily lead to a stronger focus on preventive measures by people from Stevol. Yet, a link between the awareness of water safety matters and water related behaviour can certainly be made. However the temporal dimensions of awareness of water safety matters and related behaviour should be acknowledged. When experiences regarding water safety threats are experienced a long time ago, the awareness of the risks and the perceived need to perform preventive measures is low.

Even though many people on the Meuse-Island adopted measures after the shock events of 1993 and 1995, a difference in risk interpretations is perceived between many people from the Meuse-Island and the water authorities during the shock events. Whereas the mayor of Maasbracht urged the people to leave the Meuse-Island for safety reasons by January 1995, many people from the Meuse-Island did not perceive the threat in a similar way. As the experiences with water and their related awareness of water safety did not correspond to the messages spread by the mayor, many people decided to stay. Even though this behaviour is typified as non-aware behaviour by some historical sources, it seems that people made a deliberate decision based on their experience with water which turned out to be rather accurate.

Next to a group with experiences regarding water safety, the group of people who are not aware that their area might be flooded by the river seems to be growing. Young people who did not (knowingly) experience a flood in their lives and people who moved to the Meuse-Island after the shock events seem to be less aware that a flood on the island might occur in the future. Resulting from this lower awareness, no actions regarding water safety can be expected by this people. An interesting example was given by a man who has always been living in Stevensweert. As he argued, someone moving to another place on the island will always ask were the water levels dropped during the shock events of 1993 and 1995. Since most of the people without experience hardly consider a flood risk, similar types of behaviour were not found. Next to no preventive measures taken by this group, ignorance can also result in undesirable conduct. As people with no or very little risk perceptions attribute a low (or no) status to flood defences, behaviour resulting in a lower water safety can be performed. Examples are increasing activities in the flood plains of the Meuse River and using a levee as a flower garden:

*In Maastricht, the people did not have any notion of the consequences of their behaviour. The grass cover on the levee was fully removed, as they thought it would be a nice spot for the cultivation of plants and flowers. When the water levels are rising, the whole levee will be flushed away in a moment.*

.....

### 6.3. INDIVIDUAL ACTIONS AND FEEDBACK PROCESSES

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In this section, processes of feedback on behaviour will be discussed. As a result of the reduced actions undertaken by individuals, it seems that feedback processes do not influence the water awareness of people on the Meuse-Island strongly. Nevertheless some insights from 1993 and 1995 can be found. Furthermore the absence of feedback on behaviour and action perspectives provide some interesting insights in how results and consequences of (none) action are related to the individuals' water awareness.

The policies concerning water safety in South- and Central-Limburg seem to influence the water awareness of people on the Meuse-Island. Partly due to the successful flood protection measures, no shock events regarding water safety happened after 1993 and 1995. Therefore, consequences of

preventive measures are hardly experienced by people on the Meuse-Island. As the individual strategies of most people from Stevol have not been tested after 1995, the awareness of people that they can contribute to their own water safety diminished. Following this argumentation, a vicious cycle based on the conceptual model (Figure 15) can be identified. Due to successful preventive flood policies, consequences of water related behaviour are hardly experienced by people from the Meuse-Island. As people do not experience that their behaviour enhances their water safety, the aspiration to perform preventive measures will decrease. Subsequently, the preventive actions undertaken by individuals will reduce.

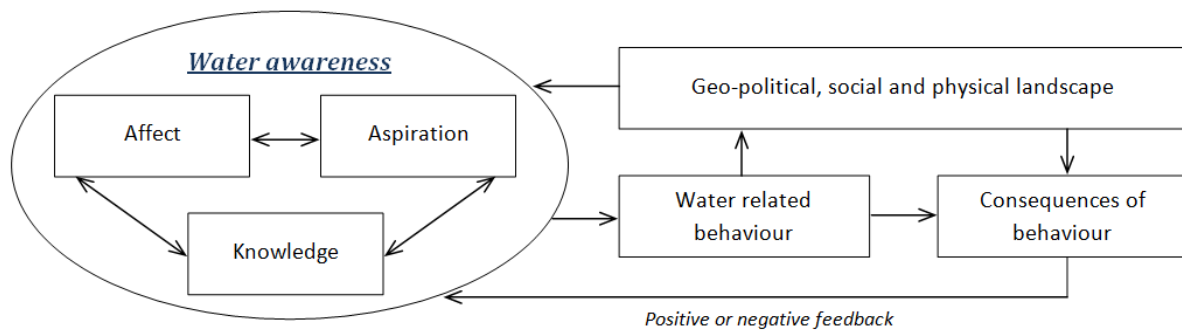


Figure 15: Conceptual model water awareness and water related behaviour

Even though the feedback process that was described above seems to apply for many people on the Meuse-Island, the awareness, behaviour and feedback on behaviour can be different for each individual. Whereas the aspiration to adopt preventive measures seems to be getting weaker for most of the individuals, the aspiration of some individuals to perform preventive measures still seems to be very strong. First, very different interpretations of risks contribute to this observed variation. Whereas some people want to exclude all kinds of risks, others are more inclined to promote water related opportunities. A striking example of very different risk perceptions was provided in Chapter 4 by a man from Stevensweert: *'As I was pulling weeds, my neighbour was carrying sandbags to his house.'* This quote strikingly describes how similar situations can be perceived very different. Secondly, the negative vicious cycle does not seem to apply for people with activities in the outer-levee-area. As their behaviour and the subsequent consequences are clear, these people are more inclined to perform preventive measures in order to safeguard their outer-levee businesses.

#### FURTHER READING

In this chapter the link between the concepts of water awareness, water related behaviour and the water safety landscape of Limburg was made. Following the description and analysis of the concepts in Chapter 4 and 5 and the subsequent connections provided in this chapter, the conclusions of this study will be drawn in the next chapter. In this chapter the main question and sub-questions of this study will be answered. Last, Chapter 8 will come up with recommendations for policies and further studies.





## 7 CONCLUSION

*What you see and what you hear depends a great deal on where you are standing. It also depends on what sort of person you are. (C.S. Lewis)*

As this study elucidated, the individuals' context is of great importance when trying to understand how water is experienced by the individual. This lesson is also reflected in the quote of C.S. Lewis above. Experiences and lessons learned in the past can have a great influence on how individuals deal with current water safety matters. In this chapter, the three different sub-questions of this study will be discussed one by one. After answering the sub-questions of this study, the main question on *'how water awareness, water related behaviour and the Limburgian landscape of water safety are related to one another in South- and Central Limburg'* will be answered.

**Sub-question 1:** How do people on the Meuse-Island behave regarding water related threats?

Since the threat of a flood on the Meuse-Island is limited, a few types of behaviours regarding water safety were found on the Meuse-Island. As argued in Chapter 4, experiences and behaviour in the past are important in order to understand how people behave nowadays. Therefore, the answer on this sub-question will focus on behaviour during the shock events of 1993 and 1995 first. Thereafter structural-, incidental- and non- actions after these events will shortly be described.

As people on the Meuse-Island were surprised by the high water levels in 1993, hardly any preventive measures were taken by people in order to prevent themselves from a flood. Therefore, behaviour during the shock event of 1993 can mostly be typified as reactive. Instantly, all materials and human resources available were used by people from Stevol in 1993 to prevent themselves from a levee breach. Even though the situation was critical, the community managed to prevent themselves from major breaches. The second flood of 1995 was less unexpected. As a result of the floods in 1993 both, individuals and public parties, were better prepared for a new flood. Early warning systems, evacuation procedures and adaptation strategies on the household level contributed to a more flood prepared Meuse-Island. Nevertheless, many people on the Meuse-Island did not follow the advice of the mayor to evacuate the Meuse-Island. As some respondents indicated, they felt safe enough to stay in Stevol.

As a result of the experiences of 1993 and 1995, many people from the Meuse-Island adopted measures in order to be better able to respond to a new flood. Roughly two types of behaviour can be seen as a response to the shock events. First, some people adopted incidental measures like the construction of tile flooring and elevated constructions. As these people experienced the nuisance of water in their house, they adopted these types of measures. Secondly, more structural behaviour was observed in the data. As some of the respondents indicated, they are keeping track of the water levels after the shock events of 1993 and 1995. As a result of these practices, people gained a better understanding on how the river system works. However, a decline in preventive behaviour regarding water safety was observed. It seems that aspiration for preventive measures and the actual behaviour to perform these measures is decreasing over the years. Nevertheless, some people with activities in the outer-levee-areas of the island are still performing preventive measures. As the floodplains of the Meuse are inundated more often, preventive actions have a higher priority for these people.

**Sub-question 2:** How did the social-, physical- and geo-political landscape of water safety develop after the shock events of 1993 and 1995?

As this study argued, some major changes in the Limburgian landscape of water safety can be observed after the shock events of 1993 and 1995. Similar to the question which is shown above, the developments will be answered from a social, geo-political- and physical- perspective.

Whereas the support in Limburg for working on water safety was very high after the floods of 1993 and 1995, the societal demand for enhancing water safety in Limburg decreased over the past years. First of all, the lower priority for working on water safety in Limburg can be seen as a result of no floods in the past twenty years. Subsequently other interests like exploiting economic opportunities related to the river are increasingly prevailing over water safety. Secondly, some developments which are not necessarily characteristic for Limburg can be found. Most important is the growing demand for democracy in water safety policies. As this study argued, people are increasingly expecting that their voice should be heard in new policies. Yet, this development is not observed in the field of water safety policies only. It should rather be seen as a society-wide development.

After the floods of 1993 and 1995, the policies regarding building in the floodplain of the Meuse changed radically. Very few activities were allowed after these shock events. Furthermore, policies regarding water safety in Limburg increasingly focused on the prevention of floods. The somewhat deviant situation in Limburg also challenges the water authorities to adjust their policies to the regional situation. Some policies and measures applied in other parts of the Netherlands do not fit in the Limburgian landscape. Furthermore the tradition of constructing dikes and levees in South- and Central Limburg is much younger than most river regions in the Netherlands. Particular challenges for Limburgian water managers were experienced after the floods of 1993 and 1995. As the flood defences along the Meuse River in Limburg got appointed as primary flood defences by The Hague, it was apparent that much had to be done in order to enhance the Limburgian water safety. As a result of appointing the flood defences in Limburg as primary defences, the focus in water safety policies shifted towards a strong focus on the prevention of floods. Whereas the Meuse-Valley was having a flood protection level of 1/50, flood defences in the Meuse-Valley now are constructed with a protection level of 1/250.

Working in the physical Limburgian landscape is also involved with some differences from working on water safety in other Dutch places. The physical characteristics like the hilly landscape and the relatively small floodplain of the river are very different from the polders in the more northerly regions of the country. These physical characteristics also influence the area that is potentially exposed to floods. Whereas water in a flat polder-landscape can inundate large areas, the potential inundation area in the 'bathtub' of the Meuse-Valley is significantly smaller. In order to prevent Limburg from new floods, the landscape in the Meuse-Valley changed significantly. The projects 'Zandmaas' (*Sand-Meuse*) and 'Grensmaas' (*Border-Meuse*) were started to enhance water safety levels in the provinces Limburg, Noord-Brabant and Gelderland. Broadening and deepening of the Meuse enhances both, water safety levels and navigability of the river. Next to major changes resulting from the 'Zandmaas' and the 'Grensmaas' projects, the construction of levees after the floods influenced the current appearance of the landscape in the Meuse-Valley. Last, gravel extractions in the Meuse-Valley changed the landscape most drastically. For decades many dredgers have been working in the valley in order to extract gravel. Due to the extractions former agricultural land has been replaced by lakes. Since the extractions of gravel were combined with the development of nature, some agricultural communities changed into tourist oriented communities. Even though the most drastic measures have been applied already, it does not seem that no changes

in the Limburgian landscape can be expected in the future. The new Delta-program might result in new water safety policies for the Meuse-Valley.

**Sub-question 3:** To what extent are people on the Meuse-Island aware of water related threats?

Water has been an important factor over the centuries for the people living on the Meuse-Island. From a historical perspective loss and propensity are inherently linked to living in the Meuse-Valley. Whereas fertile soils and a good location from an economic and political point of view offered many opportunities to people on the Meuse-Island, floods were also perceived as serious threats in the history of the Meuse-Island. Economic loss and strong disturbances resulted in challenging living conditions for people on the Meuse-Island. Due to new technologies, the people from the Meuse-Island were increasingly able to avoid harm. Whereas all crops of farmers were destroyed after a flood in the late 19<sup>th</sup> century, economic losses resulting from floods were of much lower magnitudes in the 20<sup>th</sup> century. In the 20<sup>th</sup> century, water from the Meuse still caused nuisances on a regular base, but the gravity of these nuisances were much lower than nuisances in the 19<sup>th</sup> century.

The shock events of 1993 and 1995 are important in understanding the awareness of threats related to water safety. As Chapter 5 argued, experiences regarding water safety are a major factor in the water awareness of individuals. Experiences related to water safety for most people on the Meuse-Island were mostly gained during the shock events. In general the shock events on the Meuse-Island were perceived as nuisances rather than as floods by many people from Stevol. Partly due to the fact that the community on the island managed to prevent major breaches in the levees, many people have a high feeling of controllability regarding water safety. Nevertheless, the shock events of 1993 and 1995 clearly contributed to the awareness that a flood might occur on the Meuse-Island.

From the analysis of the affective dimension, insight was gained in feelings of (in)security by people from the Meuse-Island. Most of the respondents clearly have a positive feeling towards the river and the water on the island. As they indicated, the advantages of living on the island outweigh the threat of a potential flood. When people were asked to indicate their associations with the river, potential threats were hardly indicated by people from Stevol. Following the people's associations, it is no surprise that people on the Meuse-Island feel very safe. Due to a very low number of negative experiences regarding water safety, people tend to focus on the opportunities of living on the island, rather than focusing on the threats of a flood. Nevertheless, a few individuals acknowledged that they also perceive the river as a threat.

As the cognitive dimension elucidated, knowledge and information possessed by individuals is largely based on experiences of individuals. Due to these experiences, many people on the Meuse-Island have an understanding on how the river system works. Yet, the experiences that people have are not necessarily related to the shock events of 1993 and 1995. Experiences resulting from the individual's profession or experiences of keeping the water levels can contribute to a better understanding of the river system. Next to experiences, oral distribution of information and newsletters are sources of information for people on the Meuse-Island. Strikingly the people who already know something about the water system are the ones who indicate that they are interested in these sources.

The third and last dimension of water awareness is the aspiration of individuals. As argued by the experts and observed on the Meuse-Island, the aspiration to enhance the water safety level on the Meuse-Island is fairly low. Due to the fairly positive affective feelings of individuals regarding the Meuse River, a focus on the promotion of water related opportunities was observed. Subsequently, people on the Meuse-Island are not so much inclined to perform preventive measures. Yet, the orientation on preventive activities is very personal. Whereas most of the individuals in Stevol are

focusing on the promotion of opportunities, some individuals are more inclined to focus on the prevention of risks.

As the different dimensions of water awareness elucidated, the awareness of potential water related threats on the Meuse-Island is decreasing. Whereas water related nuisances were a part of the local agenda decades ago, the Meuse River is hardly associated to disturbances anymore. Since the experiences with water are important in all of the dimensions of water awareness, it is very plausible that the awareness of threats posed by the river will further decrease in the future. The group of people who are aware of the negative impacts of the river is getting smaller and subsequently the feeling of controllability of floods is growing.

**Main question:** *How are water awareness, water related behaviour and the Limburgian water safety landscape related to one another on the Meuse-Island?*

In order to answer the central question of this study, Chapter 6 provided an analysis of the links between water awareness, water related behaviour and the Limburgian water safety landscape. Following the structure of this chapter the link between the Limburgian landscape of water safety and water awareness will be provided first. Secondly, the link between water awareness and water related behaviour will be described. Thirdly, feedback processes influencing water awareness and behaviour will be provided.

As argued in Chapter 6, water awareness is strongly influenced by physical and geo-political characteristics in South- and Central- Limburg. From a physical point of view, the limited maximum height of water levels seems to be influential. As a result of a relatively limited maximum water level in the Meuse-Valley, the probability of fatalities by a flood in the Meuse-Valley is very low. Chapter 4 argued that most people on the Meuse-Island are very well aware that the risk of fatalities on the island is low. Therefore, the outcome that people mainly experience living close to the Meuse as a blessing rather than as a threat seems to be admissible. The link between the geo-political landscape and water awareness on the Meuse-Island was clearly found. Even though flood risk policies in Limburg are not very different from policies in other Dutch regions, the regional impact of flood risk policies seems to be different. The relatively short history of Limburg with major water safety projects is an important factor in order to understand the differences. Due to this relatively short history with water safety policies, people in the Meuse-Valley attribute another status to flood defences than people in other Dutch regions. Whereas the status of dikes and other flood defences are uncontested in many places, most water defences in the Meuse-Valley are relatively new and do not have this uncontested status yet. Next to the somehow different history of Limburg regarding flood defences, the stronger focus on the prevention of floods seem to be influential in the water awareness of people on the Meuse-Island. Since the flood defences in the Meuse-Valley were only labelled as primary defences after the shock events of 1993 and 1995, the protection levels of flood defences in the Meuse-Valley in the 1990s were much lower than they are by now. As argued before, the factual risks influence the risk perception of people. Even though risk perceptions might be very different from actual risks, a relation between actual risks and risk perceptions was found. Furthermore, the activities of the water authorities have not remained unnoticed. As the water authorities in Limburg have shown that they take water safety very seriously, the people on the Meuse-Island developed an enlarging trust in the abilities of water authorities to protect themselves from floods. This trust in the abilities of the water authorities also results in strong feelings of safety. As argued in Chapter 5, the levees on the Meuse-Island resulting from prevention-oriented activities also enhance the people's safety feelings. Based on previous experiences with water safety, people believe that it takes exceptional water levels for the Meuse-Island to be inundated again.

Another link that was provided is the link between water awareness and water related behaviour. Experiences with water strongly influence the individuals' awareness on water safety matters which might result in different types of water related behaviour. As argued in this study, experience regarding water safety is very important for people in order to develop a risk perception and deciding whether or not to perform preventive measures. In contrast to people who are more occupied with water safety as a result of their profession, awareness of flood risks for the bulk of the people is strongly influenced by the shock events of 1993 and 1995. Even though these events seem to have a contribution to the awareness that people are living in an area that can be flooded, different types of behaviour were observed. First, some people took practical measures in order to protect themselves from floods or to minimize the impact of a flood. Secondly, the shock events of 1993 and 1995 changed the structural behaviour of some individuals. Thirdly, the example of 1993 and 1995 elucidates that despite the threat that people were experiencing, no measures were taken after the shock events. Whereas some of the interviewees indicated that the events did not feel like a threat to them, others indicated that they had no idea on how they could better prevent themselves from flooding. Last, the group of people who are not aware that their area might be flooded by the river seems to be growing. Young people who did not (knowingly) experience a flood in their lives and people who moved to the Meuse-Island after the shock events seem to be less aware that a flood on the island might occur. Resulting from this lower awareness, no actions regarding water safety can be expected by this people. Following the insights described above, it can be argued that a higher awareness on the flood risks on the Meuse-Island does not necessarily lead to a stronger focus on preventive measures by people from Stevol. Yet, a link between the awareness of water safety matters and water related behaviour can certainly be made. However the temporal dimension of awareness of water safety matters and related behaviour should be acknowledged. The longer it has been since the last water safety related experience, the less people are inclined to adopt and subsequently perform preventive measures.

Last, feedback processes influencing water awareness and behaviour were analysed. As argued in Chapter 6, feedback processes do not seem to influence the water awareness of people on the Meuse-Island strongly as little preventive measures are currently performed by people on the Meuse-Island. The most important feedback which was found is resulting from successful flood protection measures on the Meuse-Island. As people hardly experience the consequences of their preventive measures regarding water safety, the awareness of people that they can contribute to their own water safety decreases. Following this argumentation, a vicious cycle based on the conceptual model can be made. Due to successful preventive flood policies, consequences of water related behaviour are hardly experienced by people from the Meuse-Island. As people do not experience that their behaviour enhances their water safety, their aspiration to perform preventive measures will decrease. Subsequently, the preventive actions undertaken by individuals will decrease. Nevertheless this vicious cycle does not apply to all people from the Meuse-Island. Whereas the aspiration to adopt preventive measures seems to be getting weaker for most of the individuals, the aspiration of some individuals to perform preventive measures still seems to be very strong. As some people want to exclude all kinds of risks, others are more inclined to promote water related opportunities.



## 8 RECOMMENDATIONS & REFLECTION

As indicated in the research objective, this research aims to contribute to future water safety policies that are in line with the ways in which water safety is experienced by individuals. As different insights are provided on how water awareness, behavior and the Limburgian landscape of water safety are related, some recommendations regarding water safety policies can be made (Section 8.1). Next to policy recommendations, a reflection and ideas for further studies will be provided in Section 8.2.

### 8.1. *POLICY RECOMMENDATIONS*

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First of all, it is important for water authorities in Limburg and beyond to acknowledge their own role in how people experience water safety and how this is linked to policies performed by the water authorities. As this study argued, the more the water authorities focus on measures to prevent the people from floods, the more likely it is that people are less inclined to perform preventive measures themselves. Following this argumentations, the water authorities should be careful with making too strong claims on the capabilities of water safety measures to prevent people from floods. On the other hand, communication on uncertainties as a result of climate change and unpredictability of the river might contribute to the awareness of people that a new flood can never be excluded. Communication on the uncertainties that a water authority is dealing with might contribute to a better understanding and acceptance of water safety policies.

Secondly, some major differences in how flood risks were observed between the water manager and the local inhabitant or entrepreneur were observed. Whereas the approach of the water manager is mostly rather technical, risk perceptions of people living close to the Meuse River are mostly based on experiences. Following this insight, it does not seem to be exceptional that a technical term like a flood risk of 1/250 is often misinterpreted by people from Stevol who base their perceptions on experiences. Therefore, forms of communication on flood risks and water safety are more likely to be well understood by inhabitants and local entrepreneurs when communication on water safety corresponds to experiences of people. When experiences of people are used in the communication on for example flood measures, people are more likely to understand the message. Moreover practical experiences of people might be useful in the design of new water safety policies. As some inhabitants have a comprehensive understanding of the river system in their region, this experience might contribute to future policies.

Thirdly, as a result of societal processes of democratization, people tend to distrust authorities when no or little openness regarding their policies is provided. Even though the objectives of new policies might be very acceptable, no or little openness might result in suspicion. Furthermore, this study provided an example of how a small bit of information results in unreal stories regarding flood measures which were spread on the Meuse-Island. An early involvement of public actors can contribute to the early detection of resistance and enhances the legitimacy of the eventual measures as people have the feeling that they are taken seriously in the development of the flood measures.

Last, the group of people without experiences regarding water safety is growing as the last shock events occurred 20 years ago. Since experiences are very important for individuals in developing a risk perception, the observed indifference and ignorance in this group is not surprising. People in this group do not seem to be aware of what it takes to prevent them from a flood. Therefore, it might be valuable to target this group in communication on flood risks. By focusing on this group, the ignorance on the risks that are involved with living in the Meuse-Valley might be reduced.

As a result of the choices that have been made in this study, specific types of knowledge were acquired. Even though the results and the subsequent policy recommendations provided in this chapter might be very useful for future policies, some critical remarks on how water safety policies in the Netherlands can be made. Most importantly, the urgency of new water safety measures in the Meuse-Valley might be criticized. Even though it seems very reasonable to perform preventive measures after a major flood, the attitude of some civilians who are wondering whether the investments are worth it seems to be argumentative. As the potential harm of a flood in the Meuse-Valley is much lower than the potential harm in areas below sea level, the urgency of investing great amounts of money on water safety in the Meuse-Valley seems to be a topic of discussion. More cost-effective measures like comprehensive evacuation plans and dynamic spatial planning (multi-layer safety) might better fit into the Limburgian landscape of water safety. Yet, a strong focus of Dutch water safety policies on the prevention of floods seems to preclude other types of water safety policies. Moreover, the modern focus on enhancing water awareness in the Netherlands seems to be a very difficult task for water authorities. As this and other studies argue that a focus on the prevention of risks results in a lower risk perception, the need and the use of 'enhancing water awareness in the Netherlands (De Boer & Huitema, 2003)' seems to be low. In order to better understand how landscapes of water safety policies relate to water awareness and behaviour of people, a placial analysis might be an interesting follow-up study. By selecting multiple places along the Meuse-River, both within the Netherlands and abroad, the influences of landscapes of water safety can be studied more profound. Furthermore, the question on the urgency of focusing on preventive measures in Limburg and the Netherlands might be better answered. Resulting from this placial analysis, policy recommendations for suitable water policies, based on regional characteristics, might be provided.

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## APPENDIX I: INTERVIEWGUIDE WATER AWARENESS AND RELATED BEHAVIOUR

Als student van de Radboud universiteit Nijmegen voer ik een onderzoek uit naar waterbewustzijn in Zuid- en Midden Limburg. Door deel te nemen aan dit onderzoek helpt u om meer inzicht te krijgen in de manier waarop waterveiligheid in het Maasdal beleefd wordt. Ik deel de resultaten van het onderzoek onder andere met het Waterschap Roer en Overmaas. Het doel van het onderzoek is dat door het delen van de onderzoeksresultaten het waterschap en andere partijen meer inzicht krijgen in hoe bewoners water beleven en hier in hun projecten en beleid rekening mee kunnen houden.

Dit interview zal ongeveer een half uur van uw tijd in beslag nemen. Wij stellen uw medewerking zeer op prijs en zullen vertrouwelijk omgaan met de verkregen informatie. Uw naam en andere persoonlijke gegevens zullen niet voor doeleinden buiten dit onderzoek gebruikt worden.

### ALGEMENE INFORMATIE

1. Locatie: postcode/huisnummer *(zelf observeren)*
2. Woonsituatie: vrijstaand/rijtjes/woonwijk/buitenaf *(zelf observeren)*
3. Binnendijs/buitendijs *(zelf observeren)*
4. Kenmerken huishouden (leeftijd, aantal, werksituatie)
5. Woonachtig op huidige plaats sinds?

### DEEL I: FYSIEKE EN SOCIAAL-CULTURELE OMGEVING

1. Hoe ervaart u het wonen in Ohé en Laak?
2. Hoe zou u de mensen in Ohé en Laak omschrijven?
  - a. Heeft u veel contact met mensen uit de omgeving?
  - b. In hoeverre bent u van mening dat u woont in een hechte gemeenschap? Waar blijkt dit uit (voorbeelden)?
3. In hoeverre voelt u zich verbonden met Ohé en Laak?
  - a. In hoeverre bent u betrokken bij lokale initiatieven?
  - b. Werken mensen in Ohé en Laak samen om gezamenlijke problemen op te lossen?
4. Hoe ervaart u het wonen aan de Maas?
  - a. Welke kansen/mogelijkheden biedt het wonen aan de Maas u?
  - b. Kunt u voorbeelden geven van momenten of situaties waar u de Maas als bedreigend en/of belemmerend hebt ervaren?
5. Hoe beleeft u het landschap in de omgeving van Ohé en Laak?
  - a. Wat waardeert u aan het landschap in de uiterwaarden en welke zaken zijn minder belangrijk voor u?
  - b. Op welke manier(en) maakt u gebruik van de uiterwaarden?
6. Heeft u in het verleden een gevaarlijke situatie met hoogwater meegemaakt?

**Bij positief antwoord: keuzemodule '93/'95 uitvoeren aan eind van interview (pagina 3)**

## DEEL II: WATERBEWUSTZIJN (VOELEN, KENNEN, WILLEN)

### VOELEN

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1. In hoeverre houdt het thema waterveiligheid u (door het jaar) heen bezig?
  - a. *Positief antwoord:* Op welke manier houdt dit thema u bezig? Kunt u een indicatie geven van de mate waarin dit thema u bezig houdt (dagelijks tot incidenteel)?
  - b. *Negatief antwoord:* Heeft u een idee waarom dit thema u niet bezig houdt? Vindt u ondanks dat het u niet/weinig bezig houdt, waterveiligheid een belangrijk thema?
2. In hoeverre voelt u zich onveilig met betrekking tot overstromingen?
  - a. *Positief antwoord:* heeft u voorbeelden/redenen van wanneer/waarin u zich onveilig voelt?
  - b. *Negatief antwoord:* wat zorgt ervoor dat u zich niet onveilig voelt?
3. In hoeverre voelt u zich verantwoordelijk voor uw eigen (water)veiligheid?
  - a. *Positief antwoord:* Op welke manier voelt u zich verantwoordelijk voor uw eigen (water)veiligheid?
  - b. *Negatief antwoord:* kunt u aangeven waarom u zich niet verantwoordelijk voor uw eigen waterveiligheid voelt? Bij wie ligt deze verantwoordelijkheid eventueel wel?

### KENNEN

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4. In hoeverre bent u op de hoogte van waterveiligheidsprojecten in uw regio?
  - a. Wat is er sinds 1993/1995 in de omgeving gebeurt met betrekking tot waterveiligheid?
  - b. In hoeverre hebben deze maatregelen bijgedragen aan uw gevoel van veiligheid?
  - c. In hoeverre bent u van mening dat uw veiligheid door het waterschap en andere overheden gewaarborgd wordt?
5. In hoeverre vindt u de informatie en kennis over overstromingen die u hebt voor u persoonlijk van belang?
6. In hoeverre vindt u het van belang om meer te weten komen over het verband tussen het overstromingsgevaar en het nemen van voorzorgsmaatregelen ter bescherming tegen overstromingen?
  - a. Welke informatie/kennis heeft u al opgedaan op dit gebied? Wat is de bron?
  - b. Welke informatie/kennis heeft u nodig om adequate maatregelen te kunnen treffen?

### WILLEN

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7. Bent u bereid om zelf maatregelen te nemen met betrekking tot uw eigen waterveiligheid?
  - a. *Ja (1):* welke factoren zorgen ervoor dat u bereid bent om maatregelen te treffen? Waarom?
  - b. *Ja (2):* in hoeverre mogen deze maatregelen u tijd/geld/energie kosten?
  - c. *Nee:* waarom bent u niet bereid om maatregelen te nemen? Wat zijn de belangrijkste belemmerende factoren?

### DEEL III: WATER(BEWUST) GEDRAG

1. Heeft u voorbereidingen getroffen voor een mogelijk hoogwater/overstroming?
  - a. Zo ja: welke maatregelen heeft u getroffen en waarom?
    - i. Heeft u deze maatregelen zelf bedacht? Hoe?
    - ii. Zo nee: wie heeft u geadviseerd om deze maatregelen te nemen?
  - b. Zo nee: waarom heeft u geen beschermende maatregelen genomen? Ervaart u een kloof tussen willen en doen?
  - c. Voelt u zich goed voorbereid op een mogelijke overstroming?
2. Wat denkt u te zullen doen bij een dreigende overstroming als u thuis bent?
  - a. Wat maakt dat u op deze manier handelt bij overstromingen.
3. In hoeverre staat u achter huidige initiatieven om de waterveiligheid in de regio te vergroten?
  - a. Bij positief: (Op welke manier) steunt u waterveiligheidsprojecten?
  - b. Bij negatief: Wat roept weerstand tegen waterveiligheidsprojecten bij u op?

#### KEUZEMODULE '93-'95

1. Kunt u beschrijven hoe u de overstromingen van 1993 en 1995 heeft meegemaakt?
  - a. In hoeverre hebben deze overstromingen persoonlijk impact op u gehad?
2. Kunt u zich nog herinneren in hoeverre de overstromingen een persoonlijke impact op u hebben gemaakt?
  - a. Ben u van mening dat de schade op een goede manier is afgewikkeld?
3. Hebben de overstromingen gevolgen op uw handelen met betrekking tot waterveiligheid?
  - a. Bij ja: op welke manier is uw handelen met betrekking tot waterveiligheid na de overstromingen veranderd?
  - b. Bij nee: is dit eerder wel het geval geweest? Kunt u aangeven waarom de overstromingen geen invloed (meer) hebben op uw handelen?

### OVERIGE OPMERKINGEN

Bent u van mening dat ik in dit interview belangrijke zaken vergeten ben? Zo ja: wat zijn deze zaken, en waarom zijn deze volgens u van belang?

*Als u een samenvatting van dit onderzoek wilt ontvangen hebben wij uw e-mailadres nodig. Uw e-mailadres wordt uitsluitend gebruikt om u de samenvatting toe te zenden. Deze samenvatting wordt medio 2015 naar verwachting naar u opgestuurd.*

## APPENDIX II: EXPERTS AND WATER SAFETY OFFICIALS

| <b>Name interviewee</b> | <b>Date</b> | <b>Organization</b>                     | <b>Position</b>                                                                  |
|-------------------------|-------------|-----------------------------------------|----------------------------------------------------------------------------------|
| Michel Tonneijck        | 19/01/2015  | Royal HaskoningDHV                      | Project manager flood protection &<br>Former flood manager at<br>Rijkswaterstaat |
| Lianne Duisings         | 12/02/2015  | Waterschap Roer en<br>Overmaas          | Communications consultant                                                        |
| Madeleine Inckel        | 12/02/2015  | Royal HaskoningDHV &<br>Rijkswaterstaat | Advisor water management Limburg                                                 |
| Monique Sanders         | 20/02/2015  | Royal HaskoningDHV                      | Former technical consultant<br>Sluitstukkaden Maasdal                            |
| Suzanne Timmers         | 24/02/2015  | Waterschap Roer en<br>Overmaas          | Legal consultant                                                                 |
| Margiet Satijn          | 06/03/2015  | Rijkswaterstaat                         | Communications consultant<br>Maaswerken                                          |
| Har Rutten              | 06/03/2015  | Regional museum<br>Meuse-Island         | Conservator                                                                      |
| Geert van Lankveld      | 20/03/2015  | Waterschap Roer en<br>Overmaas          | Senior staff member licensing and<br>planning assessment                         |
| Rob van Schijndel       | 26/03/2015  | Natuurmonumenten                        | Beheer en beleid Midden-Limburg                                                  |
| John van den Berg       | 03/04/2015  | Maasgouw municipality                   | Policymaker nature and environment                                               |